

BBC ACORN

USER

DESERT ISLAND DISC:

Sailing away to
classroom adventure

FINEST FAX:

Personal organiser
page designer

ADDING TO THE ARC:

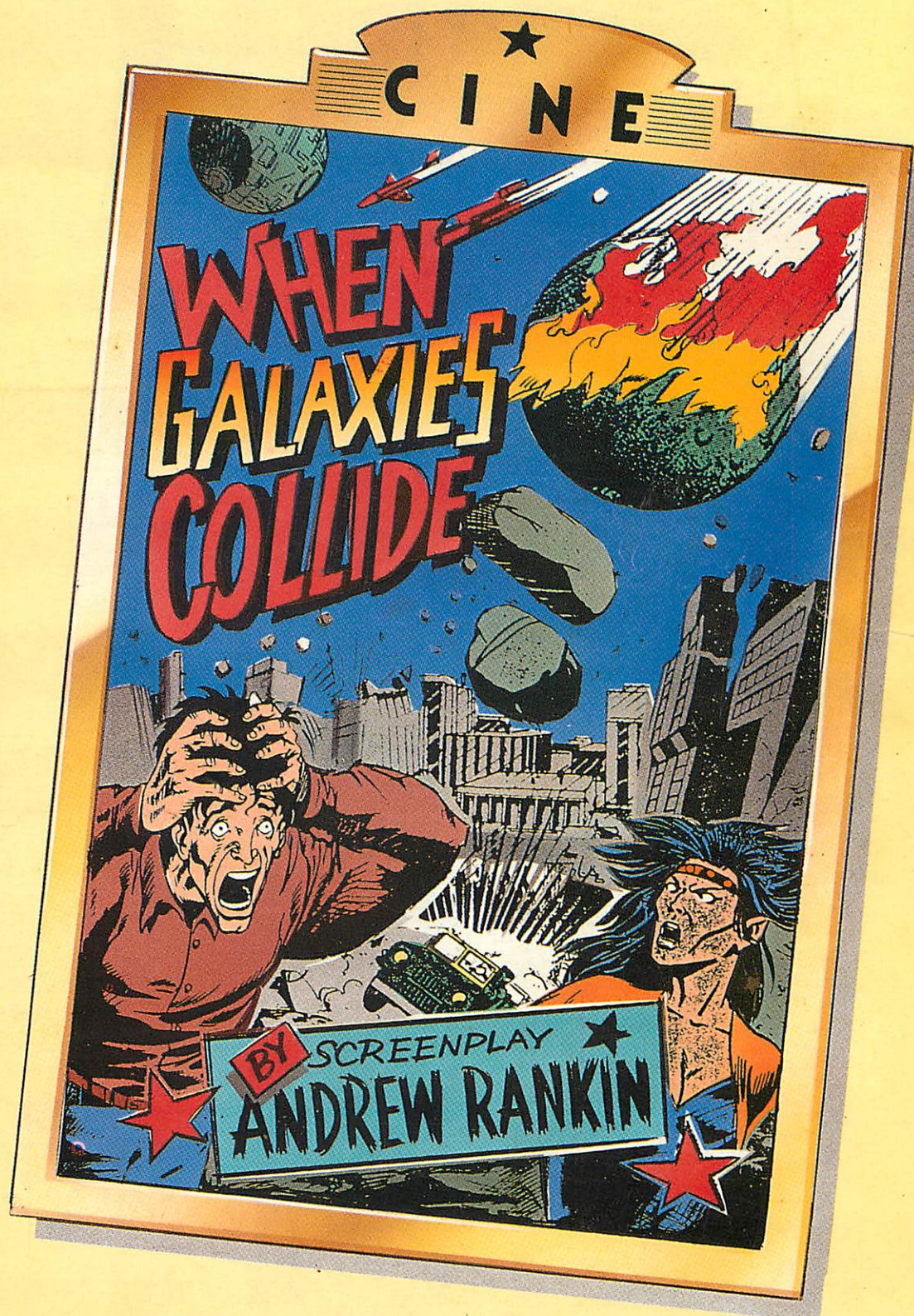
Mastering the art
of Arc interfacing

FULL PAGE BATTLE:

Wapping Editor
vs Pixel Perfect

STAR TRICK

Colliding galaxies
on-screen simulation



WIN THE NEW BBC MICRO AND A LUXURY WEEKEND IN LONDON

PLAY IT AGAIN SAM 10

**SUPERIOR
APPROVED**



ZALAGA
Award-winning Arcade Classic
The award-winning, classic
shoot-em-up from Orlando,
the author of Firetrack and
Frak! Fast, furious and
graphically superb.
"Technically excellent...very
addictive...one always feels
compelled to play again to
discover what the next sheet
is like"...Acorn User



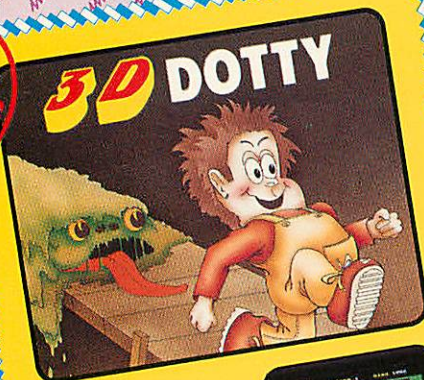
**NEW
RELEASE**



QWAK
A New Release from Superior
An action-packed game with
24 entirely different and very
amusing levels of play. Collect
the keys and fruit, shoot
the monsters and bubbles,
avoid the spikes...if you can!
QWAK the duck takes over
where the CHUCKIE EGGS left
off.



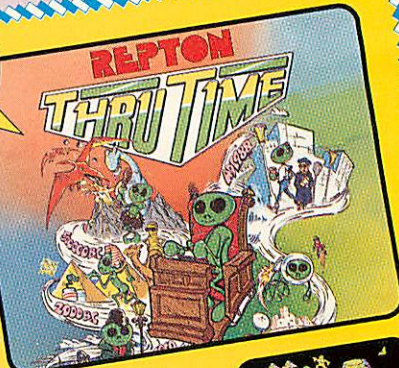
**SUPERIOR
APPROVED**



3D DOTTY
The Smash Hit from CDS
A very colourful and addictive
3-dimensional version of the
arcade classic.
"Great fun...the practice option
for all 8 screens gives you a
chance to fine tune, before
dazzling an audience with your
skills. Recommended."
...A & B Computing



**A
Superior
Hit**



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Repton's greatest adventure,
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ELECTRON GAME"
...Electron User



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(The screen pictures show the BBC Micro versions of the games.)

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PLAY IT AGAIN SAM 3 - Commando, Palace of Magic, Killer Gorilla, Killer Gorilla 2
PLAY IT AGAIN SAM 4 - Frak!, Spellbinder, Cosmic Camouflage, Grand Prix Construction Set (BBC Micro only), Guardian (Electron only)
PLAY IT AGAIN SAM 5 - Imogen, Elvir, Bug Blaster, Fortress (BBC Micro only), Moonrider (Electron only)
PLAY IT AGAIN SAM 6 - Galaforce 2, Hunchback, Hopper, The Sentinel (BBC Micro only), Video's Revenge (Electron only)
PLAY IT AGAIN SAM 7 - Firetrack, Bonecruncher, Snapper, Ghoul
PLAY IT AGAIN SAM 8 - Winter Olympiad 88, Quest, Around the World in 40 Screens, Mr. Wz
PLAY IT AGAIN SAM 9 - Camelot, Steve Davis Snooker, Spycat, The Life of Repton

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Archimedes 305 col	
Archimedes 310	
Archimedes 310 mono	
Archimedes 310 col	
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NB. It is essential to state machine and 40/80T when ordering software

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Pt 2	£14.00 (d)
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ISO Pascal	£8.00 (d)
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- o PipeDream SpellCheck is now available, with a dictionary of 93,003 words and the ability to check over 40,000 words per minute on the Archimedes.

VIEW PROFESSIONAL

- o The BBC Micro version of PipeDream which provides complete file compatibility with PipeDream and with the Z88 and which shares many of PipeDream's features.

PipeDream costs only £99.00 plus VAT, View Professional £60.00 plus VAT and SpellCheck £43.00 plus VAT.

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BBC ACORN

USER

ISSUE NO 84

JULY 1989

COVER



COVER FEATURE

Colliding galaxies on the screen of your micro on page 58
Cover by Bob Murdoch

NEWS

Prestel to merge with BT Gold 7
A feasibility study may spell the end for Prestel. Hardware manufacturers rush to the new A3000. Plus more on the BAU show

EDUCATION COLUMN

CAL 89 conference. Longmans reshuffle. Shields competition

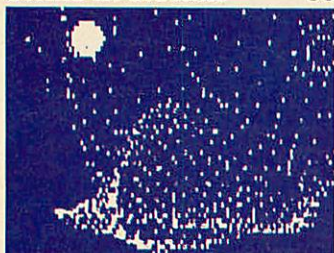
COMMS COLUMN

Prestel charges rise. Gnome mail. Archimedes telesoftware arrives

CUSTOMER HOTLINE

FEATURES

STARS IN MOTION



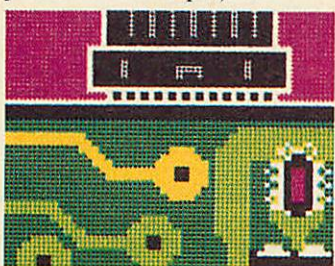
Andrew Rankin sets the universe moving on the screen of his Master. This galactic collision simulation is not only fun to play around with but it's based on the latest astronomical research

GET THE FAX

Michael Geller brings a touch of style to any personal organiser with custom printed filofax-compatible pages to keep you on time

INSIDE OUT

Alex van Someren takes a look at the expansion possibilities of the Arc and builds an all-purpose module for further projects



CHECK IT OUT

Chris Robbins presents a text checker for Wordwise Plus owners using the wordprocessor's programming language which will sort out your grammar and perfect your prose

DATA BANKING

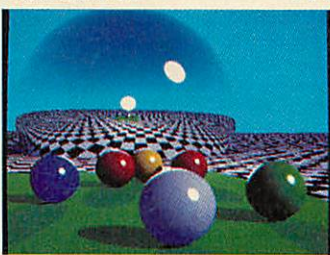
Chris Drage and Nick Evans log on to the Neris educational on-line database and see what it has to offer for teachers

REVIEWS

GETTING THE PICTURE

Dave Acton takes a look at Computer Concepts' Scan-Light Archimedes document scanner and sees if it's worth the money

LIGHTEN UP

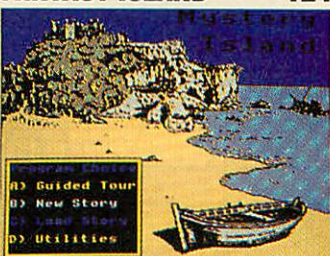


Richard Browning traces those rays to create realistic and fantastic pictures with Clares' Render Bender graphics package for the Archimedes

POWER OF THE PRESS

Bruce Smith returns to the fold to take a look at two DTP programs to stretch the Beeb to its limits - Watford Electronics' Wapping Editor and Pixel Perfect from AVP

FANTASY ISLAND



Dave Fletcher sails away for a year and a day to a host of island orientated adventures suitable for education or simply for fun

GAMES

Sam Greenhill keeps us up to date with the arcade action of the Beeb and Archimedes worlds while his cohorts take a peek at *Blood of the Mutineers*, *Ibix the Viking*, *Return of the Jedi* and the long awaited *Repton Infinity*

REGULARS

QUESTIONS AND ANSWERS

A new section of the mag featuring a selection of problems and their solutions from our Post A Problem service

ARC AGORA

Dave Acton accumulates an array of Archimedes assets: fast line drawing, formatted printing, a summer snowfall, file sizing and memory caches

HINTS AND TIPS

David Atherton has another bundle of goodies for the Beeb: loading Rom images into Sideways Ram, printing *Stop Press* fonts and some tips that all Basic users will find invaluable

SUBSCRIPTIONS

YELLOW PAGES

COMPETITION

LETTERS

ADVERTISERS'S INDEX

NEXT MONTH

A taste of summer and of the August issue of BBC Acorn User

OFFERS

DTP BOOK

TRIVIAL PURSUITS

ARCCOMM

ORDER FORMS

MONTHLY DISC

DESIGNER CASTLES

SUMMER CAMP

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Published by Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Tel: 01-490 1444. Telecom Gold 81: RED001. Micronet 919992492. Printed by Riverside Press, Gillingham. Typeset by Ican Group Ltd, Harlow. Colour by Trumps Studio, Ware, Herts. Print production by Aquarius Print and Design, London. Distributed by BBC Magazines, 35 Marylebone High Street, London W1. ©Redwood Publishing 1989. All rights reserved. Acorn is a registered trademark of Acorn Computers Ltd. Redwood Publishing is a registered data user. ISSN 0263 7456





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"It's very easy to create an entire customised front end for your own use." - Acorn User, August 1987.

"ACP is much better than any of the other front end systems I've seen." - Acorn User, August 1987.

"I can recommend it to anyone who wants easy access to the Electron's functions." - Electron User, August 1987.

ACPs main features are:-

- ★ Pull down windows operate throughout
- ★ Users can create their own windows

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"It's a superb add-on and a must for all serious Electron Users" . . .

Electron User

£39.00 excl VAT; £44.85 incl VAT

ADVANCED PLUS 7/M/E/B/C

£39.50 ex VAT; £45.42 inc VAT

An internal battery-backed RAM upgrade for the Advanced Plus 6. TWO 16K pages of Sideways RAM, battery-backed and featuring full write protect facility. Just like ABR but fitted internally & vacating a cartridge slot. This product is compatible with all Acorn BBC/Master & Electron computers.

ADVANCED DISC INVESTIGATOR

£28.75

(06)/M/B/E/C
A very powerful Disc utility for standard & non-standard discs. Backup most protected discs, edit any type of non-standard disc, check & repair faulty tracks, create new disc formats, copy 40 track discs to 80 track discs, verify two non-standard discs. ("ADI features an extremely comprehensive sector editor, and one of the finest I've seen" . . . Tubelink on Prestel) (supplied on 16K EPROM + manual)

ADVANCED 1770 DFS

3 versions ADM/C(11) - ADB(12) ADE(13)

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ACP have totally re-written the Acorn 1770 DFS, enhancing existing features & adding new ones. The result is a very fast and powerful disc filing system with the ability to operate in double density occupying both sides of a disc (640K). Automatic file relocation, improved file handling, 62 file catalogue and Sways RAM can be used as a fast RAM DISC. (16K EPROM + comprehensive manual)

PRINTER . . . Panasonic KX-P 1081 Graphic Epson Compatible NLQ ready to connect including capable, delivery and VAT £155.65 ex VAT £179.00 inc VAT (Spare Ribbon £5.50 ex VAT; £6.32 inc VAT)

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PRES pecial 3.5 dbl/sided 80 track, inc psu	please phone for details	

PRES — ADVANCED FILE MANAGER

M/B/E/C

The ultimate 'front-end' for ADFS and DFS £25.00 ex VAT; £28.75 inc VAT

Advanced File Manager 1.04 (C) PRES 1988.

Source: Advanced Disc FS.:0.\$Software.AFM.afm104						
CLM	AFMexp	App	APPS	ASM	changed	changes
LETTER102	Letter103	Letter104	manuall1a	manuall1b	manuall2	manuallch
PAL	PALB	PALM	PASRAM	9	9	9
CU	CU	CU	CU	CU	CU	CU
SD	SDC	SDC	SDC	SDC	SDC	SDC
2Pprint	2PZ6	2PZH	SPEEDY	2F	2G	2H

Target: Advanced Disc FS.:1.\$AFMarchive						
AFM	ASM	s1	s2	s3	s4	s5
s6	s7	s8	s9			

(C)change: Off (F)ollow: Off (O)ver: On 658951 bytes free 10 marked

s6 noted for copying to Advanced Disc FS.:1.\$AFMarchive

s7 noted for copying to Advanced Disc FS.:1.\$AFMarchive

s8 noted for copying to Advanced Disc FS.:1.\$AFMarchive

s9 noted for copying to Advanced Disc FS.:1.\$AFMarchive

Screen picture shows AFM in Copy mode on Master Turbo

AFM follows the PRES 'Master Plan' of upwards compatibility - it runs on Electron, BBC B, B+, B+128, Master 128 and Compact, with Second/Co-processors and Acorn-compatible versions of DFS & ADFS.

AFM has four distinct modes:

MENU - allows browsing through the files and directories on a disc. Files are started from a menu of up to 7 options chosen for a selected ROM. Loaders are provided for Basic, The Basic Editor, View, ViewSheet, ViewStore, ViewSpell, Edit, Wordwise (+) and InterWord. This list can be expanded infinitely using an Acorn-approved OSWORD call. . . full details and example in the manual.

DELETE - allows files to be marked and then deleted with one keystroke. **RENAME** - allows one or more files to be marked and then renamed using a wildcarded name, ie one which varies with each file renamed. Thus you could rename s1, s2 and s3 to be s1_old, s2_old, and s3_old in one operation. . . and that's only the beginning! As well as using the whole of the original name you can also pick out individual characters to form part of the new name.

COPY - the strongest feature of AFM. It is a two stage copy routine. With both source and target directories shown on screen the files to be copied are marked. Once all the files have been marked copying is started and the computer can be left to get on with it!

Large files can be split across several disks, and recombined. As much as possible of the computer's memory is used for copying files, including unused parts of shadow screen memory, sideways ram banks (inc. AP7), ram cartridges (inc. ABR (32K) and AQR (256K)), tube memory (up to 61K), B+ paged ram (12K) and unused parts of the Slogger Master Ramboard (Electron).

Comprehensive error trapping and recovery is provided, so a copying run will rarely have to be aborted unfinished! And there's much, much more.

THE ADVANCED PLUS 3 MK II

The only fully compatible disc upgrade running Acorn's own filing system. The MK II is now supplied with 3.5" DOUBLE SIDED disc drive providing a storage capacity of 640K. A.P.3 MK II gives you

1. A fully Acorn compatible 1770 interface (Cartridge)
2. 80 track 3.5" disc drive, double sided (640K)
3. Separate PSU
4. Acorn ADFS
5. Welcome disc
6. Utilities
7. Full documentation
8. All the advantages of the original Plus 3 PLUS extra ROM socket.

Undoubtedly the most popular disc upgrade system for the Electron (Requires Plus 1)

Remember — 2nd drives (3.5 or 5.25) can be added and the AP3 drive can be used on a BBC or Master computer! Also most Electron disc-based software is supplied on 3.5" ADFS discs.

The only fully compatible disc upgrade running Acorn's own preferred filing system (supplied on: Plus 3, Master 128, Master Compact and now the Archimedes)

*** EXTRA BONUS ***

3 games on disc — SNAPPER — DRAUGHTS — REVERSI

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"A marvellous piece of design. . . don't hesitate buy it!" — EU, May '88

£33.00 excl VAT; £37.95 inc VAT

Upgrade service available for original Acorn Plus 1 please call for details

MUSIC 5000

The popular BBC music synthesizer available for Electron users. Required 1MHz buff (see AP5). Supplied as M5000 Synthesizer hardware, 16k ROM, disc utils, and full documentation.

£99 excl VAT; £113.85 inc VAT
Please state 3.5" ADFS/5.25" DFS

ADVANCED PLUS 5

A unique interface for those wanting the maximum expansion from just one slot in the PLUS 1 AP5 contains: A User port for connecting peripherals such as a mouse. 1 MHz bus allowing Music 5000(e), prommers and various control devices to be added. Tube interface for connecting and Acorn 2nd processor or even a Master Turbo board (through a 'Co-Pto Adaptor') - & TWO spare ROM sockets (1 high priority). All hardware connections are Acorn compatible thereby allowing many BBC products to be added (remember that some software modification may be necessary for the Electron). So although some expansion options may appear expensive on an Electron you do have upward compatibility.

£55.00 Ex VAT; £66.70 inc VAT

Advanced Plus 2 ROM

We feel this is one of the best, low cost, additions we have produced for the Electron & +1 user, especially for Plus 3, AP3, ABR & AP7 users now with this easy to fit upgrade you can add:

- 1) Fix for Tape filing system in Hi-res screen modes.
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- 3) * UNPLUG - disables ROM/RAM image.
- 4) * INSERT - enables or inserts a previously unplugged ROM.
- 5) * KILL - totally disables the Plus 1.
- 6) * LOCK - locks a sideways RAM bank in ABR, AQR, AP7 7) * LROMS - locks all sideways RAM banks found.
- 8) * UNLOCK - to unlock a sideways RAM bank in ABR, AQR, AP7 9) * UROMS - to unlock all sideways RAM banks found.
- 10) * SAVEROM - saves a ROM image to current filing system.
- 11) * LOADROM - loads a ROM image from current FS into a RAM bank.
- 12) * FORMAT - will format an ADFS disc for Plus 3 or AP3.
- 13) * VERIFY - tests every sector on an ADFS disc.
- 14) * VFORM - formats and verifies an ADFS disc in one command.
- 15) * BUILD - creates a text file that can be used by *EXEC (ie IBOOT).
- 16) * LIST - displays a numbered listing of a text file 17) * TYPE - displays a file on screen with no line numbers.
- 18) * DUMP - to view a file's contents on screen.
- 19) * LANG - selects a default language to be booted on (CTRL-BREAK)
- 20) * HELP - provides a full 'help' list on all the ROM's commands.
- 21) * AQRPAGE - selects specified page in AQR.

Now there is no need to search for your utilities disc every time you want to Format/Verify a disc, Build a IBOOT file or lock/unlock/Load a ROM image into ABR PLUS much more the ideal companion from the company that produces the Acorn Plus 1.

£11.00 ex VAT; £12.65 inc VAT

The AP2 is the definitive Plus1 ROM. . . . I'm not sure what I'd do without it. . . . like all of PRES's other products, it's been well worth waiting for"

July '88

FILING SYSTEMS

ADFS VERSION 1.1

Suitable for existing Plus 3 or A.P.4 users. This new version has the software fixes for Zysyshep, write protect disable & compaction. Also Winchester code has been replaced with the necessary driving software to handle AQR as a 256k RAM DISC. Please note - ADFS is Acorns adopted standard filing system supplied on the Plus 3, Master 128, Master Compact & now the Archimedes. Supplied on 16k ROM with Welcome disc & utilities. Please state 3.5/5.25 welcome disk.

£14.95 ex VAT; £17.19 inc VAT
(ADFS manual supplied separately)

ADFS EEO

For Electron users with either Plus 3 or A.P.4 and 32k of S/W RAM i.e. ABR. All the benefits of ADFS but without all the loss of RAM! Includes all the software 'fixes' call for managing the new & original ADFS. One of the most frequent question we are asked: "How do I get back the memory lost on my Plus 3 system?" Answer: PRES ADFS & EEO regains 3.75k leaving page (i) & EEO the same as Tape!

ADFS EEO supplied; 3.5" ADFS (manual available separately)

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5.25 ADFS (manual avail. sep.) **£14.00 ex VAT; £16.10 inc VAT**

5.25 DFS(2 discs + ADFS manual) **£19.00 ex VAT; £21.85 inc VAT**

(See Special Package Prices)

DISC INTERFACES (Plus One required)

AP3 INTERFACE: As supplied with AP3 package. A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 80T drive with PSU. It runs Acorn's ADFS (as supplied on Acorn Plus Three, Master 128, Master Compact and now the Archimedes) supplied with A.D.F.S. manual and welcome disc + Utilities and 3 bonus games (please specify 3.5 or 5.25 80T format). Also provides a spare 16K rom socket.

Price £52.00 ex VAT £59.80 inc VAT

AP4 INTERFACE: A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 drive with PSU. It runs the 1770 DFS (as fitted in the BBC 'B' and Master) keeps pace at &EEO - has utilities in rom and provides a spare 16K rom socket (DFS manual included).

Price £60.83 ex VAT £69.95 inc VAT

AP34 INTERFACE: Get the best of both filing systems. Now available from PRES the ultimate interface. Fitted with both Acorn approved filing systems. . . Acorn's current standard ADFS and Acorn 1770 DFS (which can be run at &EEO) ADFS and DFS manuals supplied + ADGFS welcome disc with utilities.

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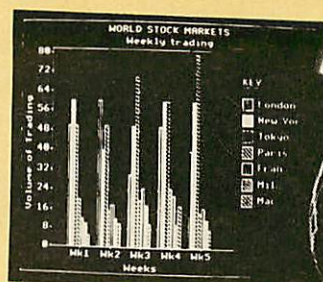


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NEWS

All out for the Arc

Rank	Company	Revenue	Profit	Assets	Employees
1	DEC	\$1.1 billion	\$1.4 billion	\$1.4 billion	10,000
2	Sun Microsystems	\$872.4 million	\$172.4 million	\$172.4 million	5,000
3	AT&T	\$789.5 million	\$33.78 billion	\$33.78 billion	10,000
4	IBM	\$594.5 million	\$54.2 billion	\$54.2 billion	10,000
5	Hewlett-Packard	\$552.6 million	\$59.2 million	\$59.2 million	10,000
6	WCA	\$487.5 million	\$5.44 billion	\$5.44 billion	10,000
7	Cray Research	\$255.8 million	\$487.3 million	\$487.3 million	10,000
8	Alfas	\$178.6 million	\$178.6 million	\$178.6 million	10,000
9	Infinit	\$120.8 million	\$1.5 billion	\$1.5 billion	10,000

Newly formed Archimedes specialist Mach Technology plans to launch 20 new hardware and software products by the end of 1989. Formed by three academics earlier this year, the company has kept its plans quiet until now.

Products available right now include *Hyperbase*, a database system, for £50. It's similar in concept to the *Hypertext* system available for the Apple Macintosh.

Basic V and Modula-2 compilers at £40 and £90 respectively will produce native Risc code, and the company will not require royalties to be paid for commercial applications that might be developed.

On the hardware front, Mach is selling a range of six hard disc systems which include the disc and podule but no backplane. At £249 for a 20Mb model and £359 for 40Mb, prices are competitive.

A product which should attract a great deal of attention at the BBC Acorn User Show is Mach-285 - a hardware PC emulator based on the Intel 80286 processor. Currently under development, the system will either come with 640K or 1Mb of Ram, be fully compatible with the IBM PC, will support either EGA or VGA graphics and costs £300 + VAT.

Mach Technology is on (0787) 238125.

Prestel to merge with BT Gold?

Dailcom Information Services has denied reports that the Prestel viewdata system is to close down.

Two stories in the February and March Issues of trade journal *Communications Management* claimed Dialcom had developed software which would enable Prestel to merge with Telecom Gold, the electronic mail system which is also operated by Dialcom.

The publication also said that Prestel would be wound down over a period of time.

A news story reporting the above appeared on Prestel's Clubspot 810 and rumours of its closure have been circulating among bulletin boards around the country.

'There is absolutely no truth whatsoever in the rumours that Prestel is to be closed down', said John Tomany, Dialcom Head of Consumer

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services, 'There is no foundation to the reports.' Commenting on the merger of the two databases he said 'There's no point. Both are aimed at different types of user.'

The offices of Telecom Gold Prestel were recently moved to Dailcom's new headquarters in Apsley, near Hemel Hemstead.

Tomany believes that the move, together with a policy of closer co-operation between both services may have resulted in some confusion within the communications industry, which has subsequently result-

ed in the stories of Prestel's closure.

However, BAU has received information that Dialcom commissioned a feasibility study to look into the technical problems in merging Prestel with Telecom Gold. The subsequent report stated such a task is indeed possible. This gives backing to the stories which appeared in *Communications Management*.

Although Telecom Gold is mainly used for electronic mail and Prestel for information retrieval, the services they provide and the type of user at which they are aimed overlap. Both systems have links to databases that cater for the business user.

InterBusiness, a Micronet product on Prestel will shortly appear on Telecom Gold as did Shades, Micronet's multi-user adventure game.

July wait for Risc OS

Arc owners who ordered Risc OS in April may have to wait until mid-July before their order is met.

Acorn started delivery on schedule, on April 3 but by May some dealers had not received their full orders while others had received none.

Peartree Dram said, 'We've been waiting six weeks for an order of 100.' Data Store took delivery of 50 Risc OS upgrades from an order of 100. 'We thought Acorn would get their act together this time',

said a spokesman who compared the situation with the problems dealers had in obtaining sufficient supplies of Mos 1.2 in 1982.

Jay Mehta of Technomatic had only received 15-20 per cent of his original order but he thought 'it's not worth complaining.'

It would appear that delivery problems for some dealers are not as bad for others. Nazir Jessa of Watford Electronics said 'we had problems in April, but all is OK now.'

Commenting on the delivery problems Acorn's Product Manager David Bell said, 'these are due to the lead time in getting Roms out of Japan, however I expect the backlog to be cleared by July.'

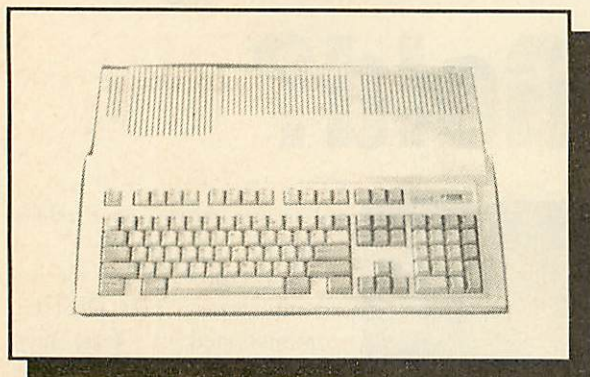
Many dealers suggested that distributors may be fitting existing stock with the new OS and only passing on the remainder to dealers. Bell acknowledges this but said he thought only be a small proportion would be effected. Acorn is on (0223) 245 200.



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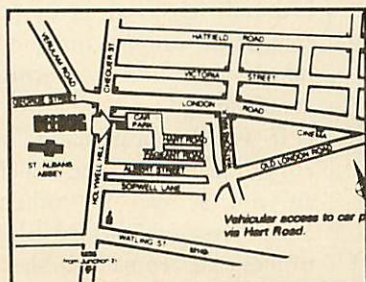
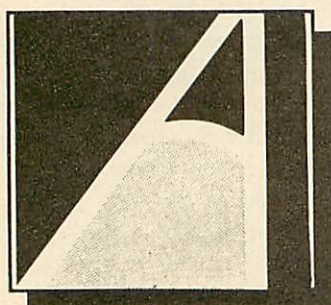
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News in brief

■ Oxfam has launched a major appeal for computer software through its shops in the London area. In particular, the organisation is interested in any games, leisure or entertainment software for any type of machine.

Donations can be made throughout June and July at any Oxfam shop anywhere in the country. It's hoped the majority of the items will be sold at selected London shops during a special computer promotions month starting 27th June.

■ Special Needs Software is giving away free 1000 packs of its *Wordwise Plus Literacy Pack* worth £60 to anyone engaged in adult literacy work.

The package consists of a wordprocessor for the BBC model B, B+ and Master together with self-study material and a range of software discs. Special Needs Software has been able to distribute the software free due to a donation of £50,000 by an anonymous charitable trust.

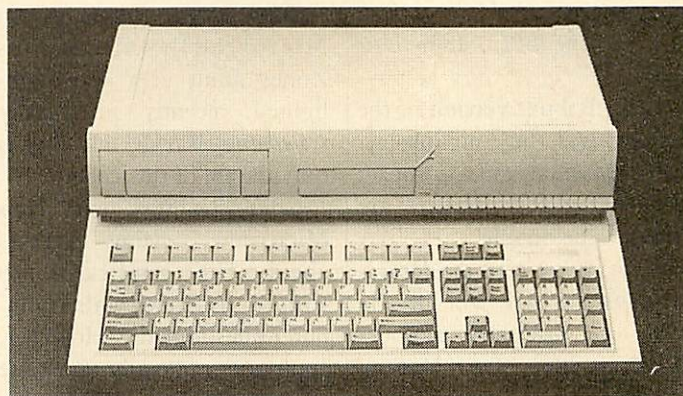
Anyone engaged in adult literacy, who is interested in obtaining a copy of the pack should write briefly to Mr Alan Clarke, Learning Technology Unit, Room W533, Training Agency, Moorfoot, Sheffield S1 4PQ.

■ Acorn has developed Risc OS versions of its language packages. Release 2 versions of Ansi C, ISO Pascal and Fortran compilers are now available. The Ansi C compiler includes a new interface library which gives access to the multi-tasking features of Risc OS. Linkage of separately compiled modules, import/export functions and in-line assembly statements are some of the enhancements to ISO Pascal. The upgrade price for the release 2 compilers is £30, while the new user price is £99. Acorn can be contacted on (0223) 245 200.

New A3000 attracts hardware makers

After the exclusive unveiling of the new Acorn A3000 in *BAU* last month, hardware manufacturers have wasted no time in planning a new range of add-ons to augment the new machine and although compatibility is a major selling point for any machine, the design of the A3000 is quite different from existing models in the Archimedes range.

Pres is releasing a plinth and external disc drive case (right) for the A3000 and a module case which can be expanded to accommodate five modules including extended Rom and Ram modules. Watford Electronics has plans to develop a memory expansion



board for the new machine.

Beebug has developed a Hayes compatible internal modem module which is expected to sell for around £200. The modem features baud rates up to V22 Bis (2400 baud), plus auto-dialling

and auto-answer.

Mass storage is popular among many manufacturers. Oak Computers intends to supply a range of hard disc systems, and Beebug has produced a disc buffer for 5.25 and hard disc drives.

BAU show update

Over 45 companies have already taken stands for the *BBC Acorn User* show which will be held at Alexandra Palace between the 21st and 23rd of July.

The new Acorn A3000 exclusively featured in last month's issue will no doubt be a big crowd puller, and several companies will be demonstrating products for the new machine.

Computer Concepts (stands 34/36) is to launch an A5 'junior' version of the Scan Light scanner. It is hoped to have this on sale at the show for £189. Also demonstrated on the Computer Concepts stand will be the much awaited *Impression* DTP package.

Pres is committed to the A3000 with its plinth and disc expansion products. Electron users will be interested in the *Pres Basic Editor Plus* which

incorporates features beyond Acorns' offering including the ability to pack code.

A small computer systems interface (SCSI) hard disc upgrade for all Arcs allowing up to four 512Mb Winchester drives to be attached to each machine will be demonstrated by Oak Computers.

Oak will also have a major revision of its parametric design tool (PDT) that incorporates extended functions.

Clares Micro Supplies will launch a sound sampling package for all Archimedes models. At £80 *Armatus* can read an entire ST disc into memory. Using the zoom facility, waveforms in memory can be edited and saved to disc. A Risc OS version of *Proartisan* with several new features including spray can, grid lock and a sprite plotting routine will also be on show.

Beebug is competing with Computer Concepts with a preview of its own DTP system at the show. An A6 hand-held scanner costing around £200 will also be on its stand together with a new hard disc backup and utilities package for the Archimedes and the latest version of its disc drive buffer.

Of course all your old favourites such as Slogger, We Serve, Watford Electronics, Hybrid, Dabs Press and many more will be at what is set to be the best Acorn show ever. Tickets for the show cost £3.50 for adults and £2.50 for children but if you buy in advance there's a pound off the entrance fee.

To get your tickets send a cheque or postal order to Safe Sell Ltd, Market House, Cross Road, Tadworth, Surrey KT20 5SR.

Expanding your castle

Data Design aims to build on the success of its *Designer Castle* software with the launch of a follow-up, *Medieval Village*, at the BBC Acorn User Show.

A ready-built version of the village will be on display. BBC Master and Compact versions of the software are hoped to be on sale.

Existing users of the *Designer Castle* package will already have the printware support Rom, making the *Medieval Village* an extension package.

Data Design's education liaison officer, Vic Wright, explained the concept of linking the two:

'They are intended to be complementary packages, both showing the use of 2-D design onscreen with 3-D output,' he said. 'They can be used as part of a primary school project but are challenging enough for GCSE level and would be ideal for model builders.'

The *Medieval Village* will cost approximately £30. For further details telephone 0484) 653176.

Diary Dates

20-22 June. *Electronic Publishing & Print Show*, Wembley Exhibition Centre, London. Tel: Blenheim Online, Tel: 01-868 4466.

7-9 July. *Interactive Learning 89*, Glasgow University. Tel: Interactive Learning Association, (0773) 824226.

21-23 July. *BBC Acorn User Show*, Alexandra Palace, Tel: Safesell, (0737) 814060.

11-12 September. *Econet 89*, Manchester Polytechnic. Tel: Acorn Computers, (0223) 245200.

18-19 September. *Educational Networks 89*, Newman College, Birmingham. Tel: LTS, (0386) 792617.

Dirty data

Offensive and explicit pornographic material is flourishing on UK bulletin boards, easily accessible to young children.

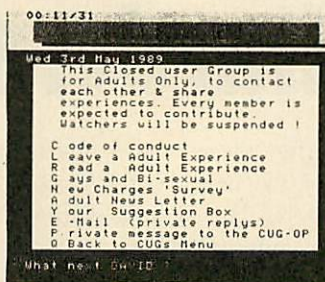
The erotic messages in Microview!'s Erogenous Zones adult area was highlighted recently in *Popular Computing Weekly* but this is only the tip of the iceberg.

Chris Rollings, who runs Microview! claims to cross check the applicants to Erogenous Zones with a computer questionnaire. However, applicants can easily give false information and Rollings admits under-aged users 'easily slip through'.

Other erotic bulletin boards like CCL4 and Heartbeat make little or no effort to check out ages of potential new members. CCL4's After Dark adult area is run by James Lawson, himself only 16!

'I haven't the time to check people's personal details,' he said, 'I'm at school all day. It's only entertainment and should be taken as just that.'

To join Heartbeat potential members must complete an on-line application form giving age and sexual preferences. Again, no attempt is made to



verify the information before allowing access.

MP Emma Nicholson has asked the Home Secretary to oppose the use of computers for obscene and racist purposes. 'It's not the medium but the offensive content which matters' she said.

However, Superintendent Les Bennett, head of the Obscene Publications Unit at New Scotland Yard, warned that stopping such activities would prove difficult.

'Before we can do anything we need proper evidence,' he said and he suggests parents who catch children looking at pornographic material should report it to their local police station. 'I would discourage anyone from trying to get into these kind of bulletin boards from both a moral and legal point of view.'

Christina Neal

How to make a plaque

John Schofield of Elsenham, Bishop's Stortford has put his Archimedes to novel use and constructed an impressive nameplate for his house.

Not content with letting a professional do the work, John used his Arc together with *Signwriter* and *Artisan* to design the lettering and daisy.

Once the artwork was complete, the words and the flower were printed using a dot-matrix printer and traced



onto a polystyrene base and a 'negative' produced by cutting out the shapes.

With the aid of Sid, the local plasterer, the negative was pinned onto the wall and the gaps filled in with a cement mix. Once dry the polystyrene was torn away and the letters painted.

Weather on Ceefax

Satellite weather pictures are available as telesoftware on Ceefax thanks to a joint venture between the Met office and the BBC. Currently a week's pictures are available with the most up-to-date being a day old.

To view the data, a special downloader and display program are needed, and these can be downloaded with a standard decoder. The display program converts the data into mode 2 screens which show cloud position and thickness. A further display



program for the Arc displays the clouds in 16 grey levels.

The service provided by Ceefax is by far the cheapest method of obtaining a satellite picture.

The Met Office can be contacted on (0344) 420242.

Masters for Cyprus

Acorn has donated six Master 128s to Mencap. In turn the machines have been donated to the Christos Stelliou Ioannou Foundation, which will send them on to Cyprus. The organisation hopes to expand into an international training and resource unit.

The Master will be used by adults with learning difficulties to develop computer skills.

Acorn Computers Ltd. is already established worldwide with its high performance quality computer systems and is the only company in Europe to have developed its own RISC processor. We are constantly striving to

improve existing products and have an impressive development programme for new products and new markets. As an Acorn user you may have the skills we need to ensure that our programme stays on course.

PROJECT PLANNER

Responsible for the collection, processing and analysis of resource information across multiple projects, you will be required to assess the implications of changes to plan, both with effect to timescale and budgets.

You should have experience in computerised resourcing with good exposure to project costing. Artemis system experience will be highly beneficial.

Self-motivated with good communication skills, you will be involved in briefing and advising Project Managers on all aspects of project plans and presenting the status of development activities to project meetings.

Ref AU/AC/010

TECHNICAL AUTHOR

At least 3 years' technical publications experience in the micro-computer or software industry is required for this role.

You will be agreeing documentation requirements with Product Management and taking the specification through to the completed manual. En route, you will be liaising with R&D, graphic designers, typesetters and printers, ensuring that the final publication is delivered on time and to the required standard.

Ref AU/PG/004

GRADUATE PROGRAMMER/ ENGINEER

A wonderful opportunity for a Computer Science graduate with experience of 'C' to join the Advanced Research and Development group. The work involves providing software support for hardware development and activities, including writing test software for hardware prototypes. Knowledge of the BBC and Archimedes product range would be useful, but above all we seek candidates who are young, keen and willing to learn.

Ref AU/SF/011

DESIGN ENGINEERS/ SENIOR DESIGN ENGINEERS

Our hardware development team is expanding and we seek engineers at all levels to design and implement electronic hardware to project specification and timescale.

Areas of specialist knowledge required include TTL and high-speed CMOS logic, PAL and PLA type programmable logic, and BASIC, C or Assembly language programming. Applicants should possess a minimum of HND in Electronic Engineering and have at least two years' experience of microprocessor design.

Ref AU/MU/012

We offer sound career prospects, training to meet future needs, excellent salary packages and benefits which include assistance with relocation where appropriate. To apply for any of these positions, please

write with full career details to Mrs. Janet Henson-Webb our Senior Personnel Officer at Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Telephone: 0223 245200.

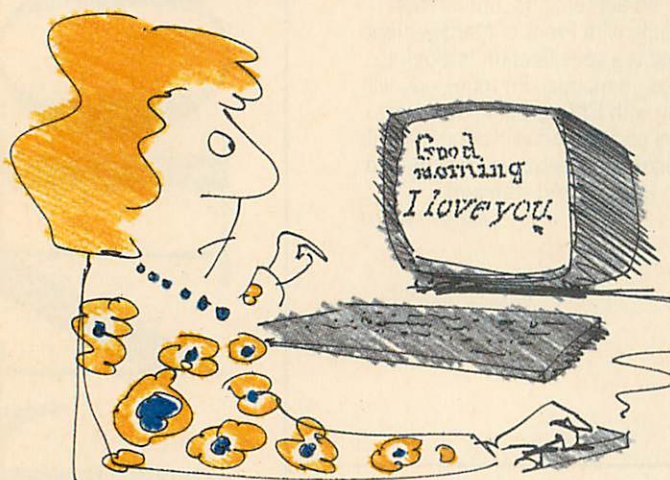
APPOINTMENTS

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The choice of experience.

OFFERS

DTP BOOK

David Hewson's Introduction to Desktop Publishing



The second book in the Gordon Fraser Desktop series is now available and is a must for anyone interested in DTP.

Desktop publishers can save a great deal of money and time if they have the right system. Choosing this system is not easy. There is intense competition in the field of DTP, and developments are taking place at a bewildering rate. This book aims to give the buyer all the information required to make exactly the right selection. It contains clear explanations of: what desktop publishing is; the type of publications that are ideal for the process; the many uses of DTP systems; businesses to which DTP is suited; the skills required.

David Hewson is the founder and publisher of *The Wordsmith*, a bi-monthly magazine for writers and publishers using new technology.

Introduction to Desktop Publishing is available through *BBC Acorn User* for only £12.50.

Please send me _____ copies of *Introduction to Desktop Publishing* at £12.50

I enclose a cheque made payable to SPA BOOKS LTD.

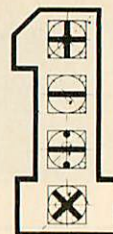
NAME _____

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Please return this coupon with your remittance to: DTP Book offer, BBC Acorn User Merchandising, 20-26 Brunswick Place London N1 6DJ.

Hear what the experts have to say about ...



NUMERATOR

Archimedes - BBC - Nimbus - PC

Marilyn Phillips, Acorn User, March 1989

'**Numerator** ... offers an exciting way to tackle anything from simple mystery machines... and number patterns, to investigations into probability and trigonometry.'

'There are very few programs that I really find innovative... To me this is what educational computing is all about - as an investigative tool for mathematics it is without parallel. It is superbly programmed, and has an excellent handbook together with useful support material.'

Dave Futcher, Educational Computing, January 1989

'**Numerator** makes numbers flow. I have never seen anything like it for representing visually the processes of mathematics. It is destined to become one of the greatest computer-based resources and will inspire many investigations, studies and activities.'

Alan Pritchard, Junior Education, May 1989

'...it is extremely versatile and sophisticated and will make an impact at a level far beyond that of any other mathematical software currently available.'

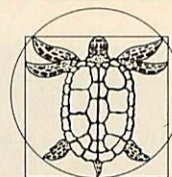
Mike Thorne, TES, November 1988

'The software ... shows the excellence of design and production... It is impressively robust and remarkably free from user-beastly features. ...this is a product of quality with considerable educational potential.'

Chris Drage, TES, January 1989

'The choice of a maths package just has to be **Numerator** - a great tool for stimulating thought and discussion about numbers.'

For more information, please contact:



LOGOTRON

LOGOTRON, DALES BREWERY, GWYDIR STREET,
CAMBRIDGE CB1 2LJ TEL: 0223 323656

CAL for more funds

Dr Noel Thompson (NCET), speaking at the CAL 89 Conference in Guildford, called for a consistent level of funding to enable the continued integration of new technology into schools. He emphasised the need for sensible strategies on the part both of local and national government to promote IT and called for sensible standards of design which will meet the needs of the user in the classroom.

He was concerned at the diversification of environments across a wide range of computers and felt that there was a place for common ground rules in the creation of software. He frequently cited the Apple Macintosh user interface as a 'useful standard' – something which did little to endear him to those members of the audience from the ranks of Acorn and Research Machines.

The conference, attended by two hundred and fifty delegates from all over the world, examined the issues of computer assisted learning in a wide variety of fields of research and development.

The next CAL conference takes place at the University of Lancaster in 1991 and possibly in Cambridge in 1993.

Longman reshuffle

News that Longman is cutting back the software division and has axed the jobs of both top men – Roger Watson and Michael Spincer – has come as a surprise to many observers.

The move comes at a time when Longman is moving into other areas of collaboration on software and seems to indicate a lessening of emphasis on the importance of the software side of its



Perhaps there is money to be made out of educational software. The success of *Designer Castles* has allowed the proprietors to invest in Porsches which they parked prominently next to the CAL exhibition hall. Unfortunately, the university authorities were less impressed than the delegates to the conference and they created a rather attractive conversation piece in the central concourse area by clamping the cars!

operation. Nonetheless, there has been little diminution of activity on the new software front, with the launch of *Hyperbook* which was developed jointly with Logotron.

Moreover, Longman's largest supplier of new materials, the *Computers in the Curriculum* project in Chelsea, has recently received proofs of soon to be released material.

However, an indication that Longman was being cautious of any involvement with new projects and cutting back commitment to software publishing was mentioned in this column in *Acorn User* July 1987. In that article it was stated that Longman was pulling out of its commitment to fund development projects at Loughborough University as it claimed that costs for new projects ran well above the £30,000 mark.

That figure is now considered to be conservative by most developers and publishers yet, at the time, Longman's replied to the article saying the costing was nonsense. Since it had been offered as information at

a conference at Loughborough by Roger Watson – Longman's man in charge of software – this seemed strange.

The end result is not to anyone's satisfaction. A major publisher is seen to be evaluating its position and the remaining publishers close ranks. How long before our educational software industry has disappeared out of sight altogether?

It's easy to speculate on the courses but it seems likely the sharp decline in everyone's software sales due to the lack of a sensible DTI Software Support Scheme (despite the funding of lashings of 16/32-bit hardware) has something significant to do with it. DTI/DES – take note!

■ Fernleaf Educational Software, in conjunction with Heritage and Heraldry, is holding a competition for primary and secondary schools. Entrants must design a shield (not a copy) using either Fernleaf's *Shields* software or any other graphic design package. In addition they must then reproduce

their design in conventional materials.

The winners will receive, amongst other prizes, a replica of their shield design, a custom-made coat of arms for the school entrance and a £50 voucher for Fernleaf software.

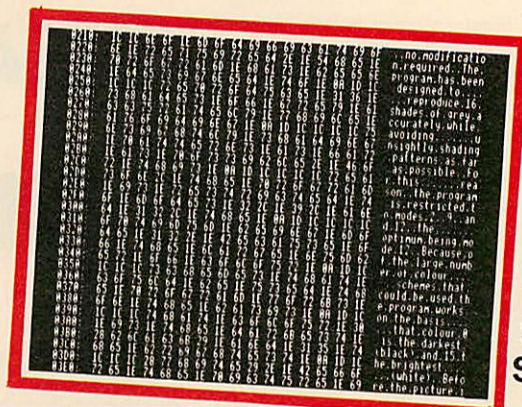
■ CWDE Software (Centre for World Development Education) has now released its *World Development* database which has files of information relating to 125 countries. Life Expectancy, Adult Literacy, Populations Growth and GNP per capita can all be searched and the system is available in *Grass* or *Quest* format. Details from Elisabeth Segall of CWDE on 01-487 7410.

■ MEU Cymru – the Welsh Microelectronics Centre – has released its latest catalogue of translated software. This has been distributed free of charge to all Welsh schools and is available on request on (0222) 561231 ext 260. MEU Cymru has an excellent range of bilingual booklets on the subject of integration of IT into education. Its lively information pack and newsletter should be required reading by all Welsh teachers.

■ Another 'vital' resource is *Computer Software for Reading and Language* produced by the University of Reading School of Education. Authors Christine Robson and Julie Radford have gathered together reviews of over 100 software evaluations. These list title, publisher and price and describe the nature and content of the software. The book costs £3 and should be indispensable to advisory teachers, resource centre managers and classroom teachers of English at all levels.

Nick Evans

The RISC USER ARCHIMEDES TOOLBOX



The Full
Screen Disc
Sector Editor

A powerful utility for the Archimedes offering:

MEMORY SEARCH

a full screen editor which enables you to find a sequence of bytes, words or characters quickly and easily.

MEMORY EDITOR

with the help of this you can examine and alter memory in either hex or ASCII mode.

DISASSEMBLER

this command displays the contents of memory as ARM instructions including floating point and co-processor mnemonics.

DISC SECTOR EDITOR

a most helpful command for examining and changing disc contents directly. Ideal for repairing corrupted discs and recovering lost files.

- FILE FIND ● FILE GO TO ● MEMORY DUMP
- FILE COMPARE ● EXALL ● CATAL



JUST ONE OF MANY...

This is just one of the many useful programs that subscribers have received free in RISC User magazine. Each issue is crammed full of:

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- significant discounts on our own software range and 5% discount on a wide range of other products,
- trade-in service to upgrade your system

SPECIAL OFFER

Subscribe NOW to RISC User and you can get the ARCHIMEDES TOOLBOX disc at the members price of only £3.50 + 50p p&p. The TOOLBOX disc is available to non-members for £15.00 + 50p p&p

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ADFS File Find Utility

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Movie Maker Animation

Writing ARM Utilities

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Order Form

Please supply the Archimedes TOOLBOX disc and documentation for the members' price of £3.50 + 50p p&p ☐ non-members' price of £15.00 + 50p p&p ☐ I would like to subscribe to RISC USER Magazine and Support Group at £14.50 (UK) ☐

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All on the up

One of the major attractions of joining Microlink has been the tariff structure, which until now has been significantly cheaper than the rest of Telecom Gold.

However, due to 'increasing costs', Database Publications (which runs Microlink on the Telecom Gold database) has been forced to revamp the pricing structure.

The good news is that connect time charges have been reduced from 11p peak and 3p off-peak to 5p peak and free access off peak respectively. This compares favourably with the rest of Telecom Gold which charges its subscribers 6.5p peak and 2p off-peak.

The bad news is that the monthly standing charge of £5 has now been increased to



£7. However the really bad news is that Microlink has fallen into line with the rest of Telecom Gold and introduced a data charge.

The cost is 4p peak and 1p off-peak for every block of 512 characters sent or received by Telecom Gold.

It's been on the cards for some time now that Telecom Gold will eventually introduce 2400 baud access with MNP level five. This would effectively mean that subscribers with suitable modems will spend far less time on-line.

Nevertheless, the introduction of the data charge will

ensure that no matter at what speed you access Microlink, you'll still be charged the same amount for data you either send or receive.

All very fair you may think but a major attraction of Microlink was the lack of any data charge. This was reflected in the type of service provided with large volumes of text available to read on-line. The data charge will put off many subscribers from browsing around the system and looking at these areas and that isn't good for anyone.

Gnome mail commands

The Gnome at Home (viewdata on 01-888 8894) now features extended mail commands. Besides being able to send and receive mail, subscribers can forward mail items, edit the original item before sending on and other fancy things.

When using the on-line editor, pressing # will display a non-destructive window that lists the commands available. Selecting an option will execute the command and close the window - neat!

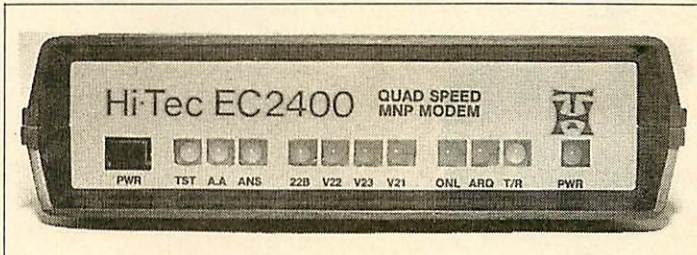
IPSS increase

Educational establishments and serious comms enthusiasts making data calls to the US tend to use the IPSS data network which works out cheaper than calling direct.

This has all changed now as British Telecom has scrapped the time charge. In its place is a revised data tariff.

The new charges are 0.28p per segment for European calls, 0.70p for North American calls (including Canada) and 0.82p per segment for the rest of the world.

For IPSS users who use



interactive services (such as the CB simulators) their IPSS bills will be reduced as there is no time charge and very little data is transferred.

However, for those who transfer text or binary files, the new data charges will be an absolute killer. Just take the following example of an IPSS call to the US.

Typically, an average segment is 40 characters in length. Connected to a service at 1200 baud and downloading a file with Xmodem at an average of 110 characters per second, that's 6600 characters per minute - all of which comes to an astonishing £115.50 per minute!

Should you use a 2400 baud modem or (God forbid) one with MNP data compression then the costs will be absolutely astronomical. In fact it will be far cheaper to call the US direct. . .

Phantom modem

For £160 the Microlink multi-speed modem has been the cheapest 1200 baud, Hayes compatible unit on the market. However, I now understand Spectre Communications is selling a modem with a similar specification for £149.45 inclusive of VAT. No details were available at the time of going to press, so to find out all about it just call Spectre on (0931) 5362.

Taming the beast

An absolute must for any serious comms enthusiast is a V22 bis (2400/2400) modem. However such beasts tend to cost rather a lot because the method of transmitting data over the PSTN is completely different from that of a V22 (1200/1200) modem.

All this has changed now. Thanks to a new modem chip from Western Digital and some ingenious design work, Hi-Tec Supplies is selling a V22 bis modem (unapproved) for £279 all-in.

Not only does it feature all speeds up to V22 bis, but it also has MNP error correction to level four and MNP data compression to level five. Call Hi-Tec on (0733) 52440.

Arc telesoftware

The Arc now has a telesoftware section on Micronet. Currently there are only three files available, two weather maps and a simple cassette inlay printer.



If you have any comms news please send it to David Janda at BBC Acorn User or contact him on Telecom Gold 81:RED001 or via Prestel 942876210.

QUESTIONS AND ANSWERS

If you have a problem with an Acorn micro, commercial software or a program you are trying to write then *BBC Acorn User* can help. The *Post A Problem* service guarantees to give you an answer within 10 working days for just £4.

Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon at the bottom of this page and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you want recorded delivery add on the cost of this.

Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the *Post A Problem* service will only be able to make general comments. The service will answer the problem and return all material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you can't lose!

BBC ACORN USER READER SERVICE
20-26 Brunswick Place, London N1 6DJ.

NAME _____

ADDRESS _____

POSTCODE _____

DAYTIME PHONE NUMBER _____

I enclose a cheque/postal order for £4 made out to Redwood Publishing and an sae with my problem.

OFFICE USE ONLY Date in: _____

Date out: _____

Answered by: _____

PIN MONEY

I have an Epson FX-80 printer which has worked very well for a number of years. Recently it has started to print with a gap running through the middle of the letters. Can you please tell me what I could try to fix it before taking it to a dealer for repair?

The fault with your printer is most likely due to one of the printhead pins being blocked.

This is probably due to ink from the ribbon clogging up the hole it normally travels in. You should be able to fix the problem yourself if you carefully remove the printhead and clean it in alcohol (the sort sold for cleaning cassette and video heads is suitable).

If this doesn't clear up the problem, the fault is probably more serious.

It could be that one of the printhead pins has broken or the solenoid which activates the pins has developed a fault. You will then have to replace the printhead, either yourself or by taking your printer to a dealer for repair.

SEEING DOUBLE

I have a single double sided Mitsubishi disc drive. I want to fit a second drive and configure this new drive as 1 and 3 and the old drive as 0 to 2. I have heard this is possible by altering the links inside the new disc drive casing. Can you tell me in more detail what I need to do?

You are quite right that to make the second drive operate alongside the original

you will have to alter the internal links. This will be in addition to connecting the two drives together.

Take off the new drive's metal casing and you should find a set of links. This should be labelled 0, Do or So. You will need to move this link so that the link labelled 1 (or D1 or S1) is made.

As well as altering the links you should look for a resistor pack (which looks rather like a ceramic IC). On a dual drive system this resistor pack is not needed. It only has to be present in a drive that is at the end of a cable.

MOVING AROUND

I am developing some software that really does need to use the full 64K of memory usable with the disc version of BBC Basic called Basic128. I want to copy the program off the Welcome disc onto my own working disc but I am having trouble trying to do this. I cannot get *COPY to work. What should I do?

Copying BAS128 and BASobj onto your own discs is not that difficult if you are aware of the commands required.

The BBC Master 128 and the Master Compact Welcome disc are in ADFS format. The *COPY command in ADFS will copy a file from one directory to another but not from disc to disc like *COPY does when using the DFS format. You have to use the *MOVE command.

Unfortunately Acorn has not documented these commands very well in the Master series manuals. The correct syntax for the kind

of move you require is:

```
*MOVE -ADFS=:O.LIBRAR
Y.BAS128 -ADFS=:1.BASIC1
28
```

```
*MOVE -ADFS=:O.LIBRAR
Y.BASobj -ADFS=:1.BASICo
b
```

If the copy operation takes place within a given filing system it is not necessary to specify the filing system (although in this example we have).

CLOSER SIMULATION

I am having problems trying to run Microsoft's *Flight Simulator* version 3 on my BBC Master 512. *Flight Simulator* loads in black and white and appears ready to start but the keyboard is inoperative. The instrument panel seems live as the values update themselves from time to time.

The program is close to running normally. Can you offer any advice?

If you purchase IBM PC software especially to run on a Master 512 then you need to ensure the dealer will let you test the package running on your machine before buying.

You could also consult a compatibility chart such as the chart printed in the September 1988 issue of *BBC Acorn User*. Here *Flight Simulator* is listed as being compatible. However, the version of *Flight Simulator* is important! Version 2.12 certainly works but version 2.13 does not.

There is a piece of software that may help. It's called *DOS Plus Problem Solver* and is published by Shibumi Soft of R Porf Camara Sinval, 138, 4100 Porto, Portugal, for £24.95. This package aims to solve the compatibility problems of Master 512s and IBM

software. It was reviewed in the May issue and Shibumi's advertisement claims it will run all versions of *Flight Simulator*.

NOT A PIPEDREAM

I have a Cambridge Computer Z88 and would like to transfer *Pipedream* files from a Z88 into *Interword* leaving them reasonably formatted. What could I use to carry out the transfer?

For transferring files from your Z88 to your BBC micro, there are a number of utilities available. These include the expensive one from Cambridge Computer and one published in the January 1988 issue of *BAU*. Z88 owners at *BAU* use this one for transferring all Z88 *Pipedream* files.

You should be able to load your transferred files into *Interword* without too much trouble. Try option 4 at the main *Interword* menu 'load text to cursor' rather than option 2 which is 'load new text'. The formatting should be all right but there will be spaces and RETURNS where you don't want them to be.

When correct formatting is essential, it is much easier to load Z88 *Pipedream* files into *View Professional* which uses the same format. However, you have to go to the expense of purchasing and learning another word-processor. I personally load all my Z88 *Pipedream* text into *Wordwise Plus* and run a segment program which takes out all the double spaces and returns. I then format things from scratch but at least I know I am putting in the spaces and RETURNS exactly where I want them put!

CUSTOMER HOTLINE

Welcome to another Customer Hotline column. This will be my last column but more on that later.

■ If you have ever wondered how space allocation under DFS and ADFS differs, or have been stumped by the concept of compaction, then read on!

Unlike DFS, ADFS has provision for extending files beyond the space allocated to them on a disc. On DFS, space is contiguous for a file, and each file has a space on the disc starting from a particular sector number recorded in the catalogue.

If there is space after the file on the disc, the file can expand but only until the point on the disc where another file starts, or the end of the disc is reached.

Compaction in DFS removes all free space between files. So no file (except the last file on the disc) can expand beyond the end of its final sector.

The last file on a disc may be identified as the file which comes first in a *INFO #.* operation on the disc.

In ADFS, the file storage is still contiguous (except for E format under Risc OS on the Archimedes) but file expansion beyond the end of the space available is possible.

This is achieved by physically copying the file to a different place on the disc, where more space is available. The place on the disc previously occupied by the file then becomes vacant.

The obvious corollary of this is that for a file to expand beyond the allocated space, there must be a contiguous space on the disc available of more than the space currently occupied by the file itself.

This is of particular importance in database applications where files may expand. If a file is stored so that it has to expand, the best place for it is as the last file on the ADFS disc. However, there is no simple way for the user to determine which file is last on the disc.

So in, for example, a *View-store* application, it is sensible for the actual file holding the database information to be on a disc by itself (in this case the D.file) and other smaller 'housekeeping' files to be on another disc.

This means that there is no obstacle to file expansion. ADFS is, in this manner, like DFS. It is possible to create files before use on a blank disc (on a Master 128 and later, use *CREATE), with the last file being created being the database file itself.

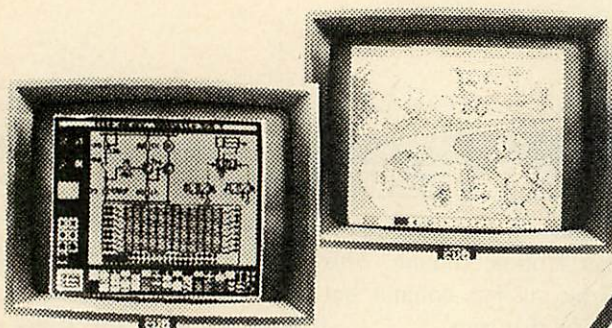
Each file will then have its own area to occupy. However, this method can backfire if one of the smaller files gets too large – it will be copied in front of the database file, potentially causing an obstacle to its expansion.

If the file tries to expand beyond its length and is physically too large to copy onto the free space available, it will report 'Disc full' or 'Compaction required'.

Incidentally, it should be noted that in both DFS and ADFS, compaction removes space between files.

■ As I mentioned at the beginning, this will be my last *Customer Hotline* column. However, as so many of you have thanked *BBC Acorn User* and myself for this column, I have bullied one of my colleagues into taking it over. I will leave him to introduce himself next month.

Phil Colmer



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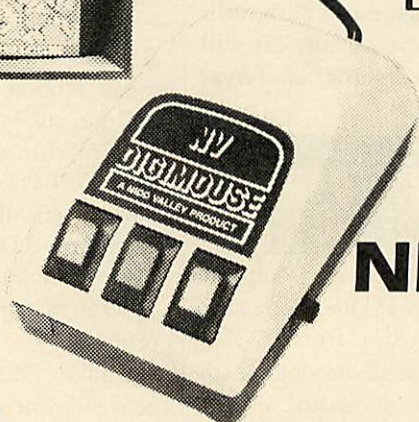


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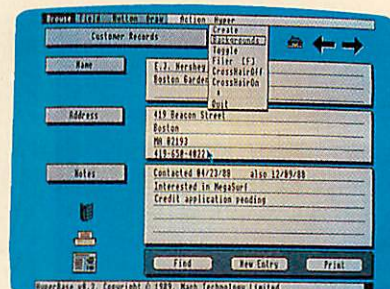
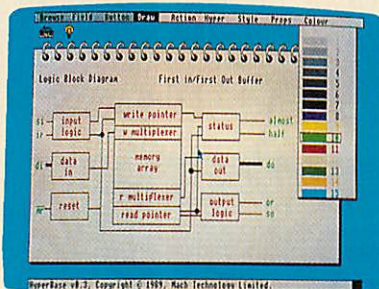
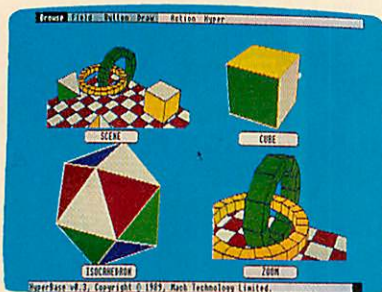
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BBC ACORN USER JULY 1989

SNOW DOODLE



Doodle away with digital snow!

This month's graphic offering is a little animated doodle from the warped mind of BAU regular Dave Lawrence. It's ... well ... it's difficult to describe really – sort of digital snow. Now that everyone is a bit fed up with the original 'Game of Life', interest is turning to other sorts of 'real-life' simulation. Listing 4 illustrates the idea.

In essence, a large number of dots are dropped onto a simple landscape to see where they roll.

Use the mouse to set up the landscape in the first place: hold the left button down to draw a line, press the middle to drop a 'random' triangle and press the right button when you are ready for the shower to begin!

The main work is done by the machine-code routine .fall. Each dot continues down the screen until it can fall no further. Then, it chooses a random direction (left or right) and moves off again until it finds itself trapped.

When a dot can move no further it is left in its final resting place and a new one is created at the top of the screen. To prevent dots being stopped in mid-air by a sudden rush of other dots nearby, a counter is set up once a dot cannot fall any more. It waits for up to four frames to see if the congestion clears. If so, it moves on, if not it tries to move left or right instead.

To make things a little more interesting, dots are dropped at different speeds. The final effect is somewhat spectacular, if a little odd! Each dot has its own twenty bytes of information in the table called (unsurprisingly) table. These bytes are split into five words:

- word 0 address of dot on screen
- word 1 colour of dot

- word 2 direction of dot
- word 3 speed of dot
- word 4 used as a counter by .fall

Random positions and directions are generated in the traditional way using a 'ring counter'. If you would like to set up a new landscape, by the way, press ESCAPE at any time.

There are many ways in which this little doodle could be enhanced. For example, at the moment dots will continue to move left and right until either they can fall further or are 'boxed in'. Real snow (or real anything for that matter) clearly doesn't roll along indefinitely so you might try applying a counter to a dot that stops it rolling after a randomly chosen delay.

As Dave points out, to do a 'proper' simulation, you would of course have to keep track of all the dots that have ever fallen. This would be slower but more realistic, since it would mean that if there were an unexpected 'avalanche' for example, dots that had previously come to rest could move off again into the newly created space.

£5 MISLEADING OS FILES

In April I mentioned the use of OS_File call 5 in finding the lengths of files. As one of our Agora regulars Terry Blunt points out, this is not without its hazards. The main problem is that the call does not generate an error if a file does not exist. Instead, it returns an (often enormous) file length!

Terry offers a function that performs the check – listing 5. FNSIZE takes a filename as a parameter and returns the length of the file if valid, or 0 otherwise.

The file type is returned by OS_File in a% and this will be the figure 1 for a file, 2 for a directory and 0 if the file doesn't exist at all.

Note that OS_File does generate an error if the filename provided is null or contains illegal characters. You might like to use sys "XOS_File" in the function to avoid this.

CACHE POINT

Now that Risc OS is well and truly with us, I'd like to cover at least one feature of the new operating system each month. We start with a brief look at file and directory caches.

Many new *CONFIGURE options are

available with Risc OS and these include ADFSDirCache and ADFSbuffers. The former is configured in K and anything up to 255K may be set aside. This space is used by the operating system to store previously explored directories in a compressed form. Thus, subsequent examination of the directories is very much quicker since the disc isn't 'whirled' each time.

Directories from a number of floppies can be cached in this way and this has its good and bad side.

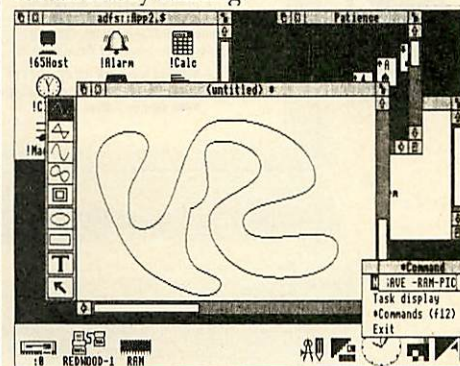
On the plus side, the operating system has more of an idea than it had before of which disc contains what. On the negative side, it can be annoying when the operating system says 'Disc not present' because the file you're trying to run on the current disc also exists on a previously inserted disc and the operating system is trying to load the other version as well!

This is perhaps an unavoidable feature of such an approach and makes the command *NOLIB very useful.

This is the command that tells the operating system to forget about any other libraries it has come across in the recent past.

The ADFSbuffers *CONFIGURE option determines the number of 1K buffers used by the operating system when handling files. I currently have 16 such buffers configured and find that just about right.

These are used by BGET, BPUT and the assortment of other filing system calls and, under certain circumstances, the space set aside may be used temporarily for directory caching.



Risc OS – a closer look each month

If you have any programs, ideas, hints and tips of use to budding Archimedes users that you think are worthy of publication, then they should be sent to: Arc Agora, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Up to £20 and buckets of fame await the select few who take the plunge to instant Agora adoration.

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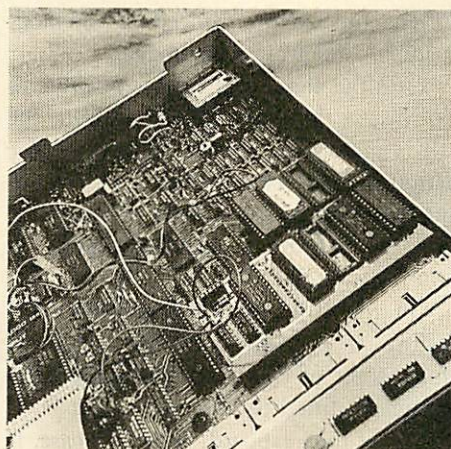
David Atherton

A lot of people have asked me about loading Rom images – disc copies of Rom software for use in Sideways Ram – in !BOOT files, and why certain operations using them sometimes fail, especially if the Rom requires workspace.

A good example of successful Rom image loading is the !BOOT file supplied with *AMX PageMaker* Master 128 disc version – this loads the program into Sideways Ram, reboots the system, and then runs the !BOOT file again, but somehow ‘knows’ that the Roms are now installed, and does something different the second time around.

Loading sideways Roms with a !BOOT file should be simple enough – just *LOAD or *SRLOAD the relevant file, and then issue the appropriate commands to start up – for example if a copy of the *View* Rom was saved on disc as VIEW, you should be able to issue *SRLOAD VIEW 8000 4, followed by *WORD. However, it isn’t as simple as that. For a Rom image loaded into Sideways Ram to work, three other things must happen – firstly, the Rom table located at &2A1 in memory must be loaded with the Rom ‘type byte’ (stored at location &8006, the seventh byte in the Rom), secondly any workspace needed by the Rom must be claimed, and finally, any vectors set by the Rom at startup must be in place. To simulate these last two actions for any specific Rom is possible, although not always easy, but to write a general purpose routine for any Rom is almost impossible. The usual solution after loading a Rom image into Sideways Ram is to press CTRL-BREAK, which will initialise the Rom fully. The problem is, how do you simulate CTRL-BREAK with a command, and then how do you make the system ‘carry on’ after the command?

The simplest method of simulating CTRL-BREAK, which works with all versions of the BBC micro and Master



Sideways Ram: loading isn't so simple

Series, and all operating system Roms, is to instead simulate a power-on reset. ‘Soft’ Break, the action taken when you press the BREAK key without CTRL, can be more-or-less simulated by a machine code jump to the address contained in memory locations &FFFC and &FFFD. In Basic this would be CALL (!&FFFC) AND &FFFF, although the shorter CALL !-4 works just as well. However, a soft break does not fully initialise the Roms. To make this into a power-on reset, the command should be immediately preceded with *FX151, 78, 127. This *FX command, which is equivalent to setting location &FE4E to &7F, sets a special bit on the slow data bus (system VIA), which is normally set in hardware for a few milliseconds when the machine is powered up. It is this bit which is used to detect the difference between power-up and hard resets. You will find that issuing this command cause all I/O to hang up, so you can’t issue CALL !-4 from the keyboard. Don’t worry though, commands following the *FX call in and *EXEC file (provided the next command is within the same 256 byte block of text and therefore read from buffer not disc) or even a Basic program will work correctly. The reset performed by these

two commands will correctly initialise sideways Rom images loaded into Ram. It will however wipe the rest of the Ram in the machine.

However, we can rely on the operating system itself to provide the necessary information. During normal initialisation, type bytes, as mentioned above, are set up in locations &2A1 to &2B0, for each valid Rom image found. For those slots which are not found to contain a valid Rom, the relevant entry is zero. This can be utilised in the !BOOT file – before a Rom image is loaded, the table can be tested to see if the Rom is already loaded, and if so, the next stage can proceed.

This is the !BOOT file to load *View* into Sideways Ram slot 4, *ViewSpell* into slot 5, and *CommStar* into slot 6.

```
VDU 21
*BASIC
IF ?&2A5<>0 THEN *EXEC
C !BOOT2
*SRLOAD VIEW 8000 4 Q
*SRLOAD VSPELL 8000 5
Q
*SRLOAD COMSTAR 8000
6 Q
*FX 151 78 127
CALL !-4
```

VDU output is switched off – purely for appearance’s sakes, it is not necessary to the function of the commands, and Basic is entered, so that the IF statement can be used. Only the first Ram slot is checked by testing the value of &2A5, which contains the type byte if any for the contents of slot 4. We have just reset the machine with SHIFT-BREAK, so if &2A5 does not contain 0, there must already be a valid Rom image in sideways Ram slot 4. If this is the case, an auxiliary !BOOT file, !BOOT2 is run instead. Otherwise, the three Rom images are loaded from disc in turn to their respective sideways Ram slots, and then the commands which force a ‘power-on’ reset are issued. Of course the *STLOAD commands specific to the Master Series are BBC 1770 DFS –

HINTS & TIPS

you may have a different command, or indeed a program to load your Rom images. Any other commands will work, so long as after loading, the two commands which cause a reset are issued.

The CALL !-4 causes the machine to reset, and of course it goes through the same procedure again, executing the !BOOT file – it can do nothing else. This time however, the Rom banks are full of code, and so even before the !BOOT file execution began, the operating system has set up the Rom table – so when the test is made in the second line of the file, &2A5 is found to contain the type byte for View, a non-zero value, and so !BOOT2 is EXECuted. The BBC operating system only allows one EXEC/SPOOL file to be open at once, so !BOOT is automatically closed and the remaining Rom loading and resetting commands are discarded. !BOOT2 switches back on video output to display a short message – more on this in a moment – and sets up function key 0 with the desired task, in this case to CHAIN a program called START. Notice how a CTRL-F is placed at the start of the function key string to switch video output back on. Finally all buffers are flushed and the command is inserted into an known empty buffer:

```
PRINT CHR#6;"Release
the SHIFT key now"CHR#
21 REPEAT UNTIL INKEY=-1=
0 *KEY 0"IFCHAIN !"STAR
T":"M"
*FX15
*FX138 0 128
```

The last line, CLOSE#0, is not actually needed. When the command is executed, the EXEC file has finished, and so there is no file to close, and consequently DFS/ADFS gets confused and reports a 'Channel' error. However, I have found that in certain circumstances, if you don't issue this command, Basic programs started up afterwards get equally confused about whether any files are open or not, and although it generates an error, it doesn't harm the operation of the sequence so I have left it in. Note incidentally that the command set up on the function key doesn't have to be a CHAIN – it can equally well be a star command to start one of the Roms you have loaded.

You will have noticed that you have to hold SHIFT when first pressing BREAK to activate the !BOOT file, and that you

must be holding SHIFT again, when the machine resets, so that the !BOOT file is executed again.

I have even included a couple of lines to tell you when to stop holding SHIFT, and to make this system work as it stands you must keep holding SHIFT until the screen tells you to let go.

People have asked me in the past for a fully automated system which they intend to use with a mains timer, so that the computer will come on at a certain time of day, and start executing a program. Often this setup procedure includes loading a Sideways Rom image.

With the above system it is possible to do this, as there is a facility on both the BBC micro and Master to reverse the action of SHIFT-BREAK, that is to execute the !BOOT file if SHIFT is *not* pressed, and only to perform a standard startup if SHIFT *is* pressed.

On the BBC model B and B+, this facility is controlled by the keyboard links, a set of eight dual inline switches optionally fitted to the lower right hand corner of the keyboard, under the case. If link 3 is 'on', that is, connected, then the reversal is active.

This can be overridden in software using *FX255, but any *FX255 setting is in turn overridden by the links position at a hard reset. An automated BBC system could however have this link fitted, and accordingly execute a !BOOT file as soon as it was powered up, provided there was a disc in Drive 0.

On the Master Series, the reversal is handled by a CMOS Ram (or EEPROM on the Compact) setting, controlled by a *CONFIGURE command. *CONFIGURE BOOT reverses the normal action, ie, makes the machine autoboot on BREAK without SHIFT, and *CONFIGURE NOBOOT restores the normal action.

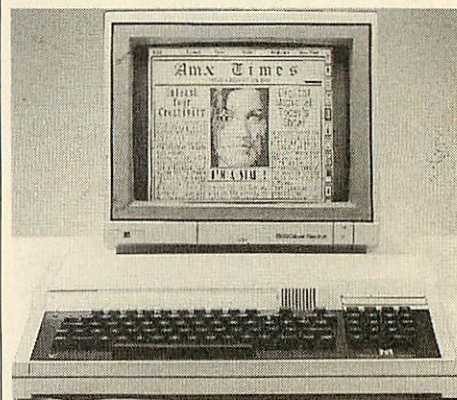
It is even possible to set up the Master so that you still perform SHIFT-BREAK for the first time round the !BOOT file, but don't have to hold on to BREAK to do it a second time.

To do this, you would insert a *CONFIGURE BOOT command after the IF statement in !BOOT above, and a *CONFIGURE NOBOOT at the start of the !BOOT2 file. This will work fine provided you don't try to interfere with the booting process whilst testing it, for example, by pressing BREAK before the whole operation performed by the two files was complete.

£10

DOWNLOADABLE STOP PRESS FONTS

Robin Barnes, from Westcliff-on-Sea, whose article on programming the Kaga Taxan KP-810 was published a couple of months ago in this column, has written again, with a useful routine for those of you who don't want to design your own fonts, and own a copy of the AMX (now Watford Electronics) *Stop Press* package. Robin's program converts the *Stop Press* fonts (of which there are fifteen supplied with the package) into a format suitable for downloading to the printer.



Stop Press fonts – squash and print

The converter program uses a short machine code routine to rearrange the format of the pixels that make up a letter. This is then converted into a printer character by a Basic routine. The program automatically calculates the proportional data for the letter, and adds a descender where appropriate.

As the fonts in *Stop Press* are arranged on a 16x16 grid and those on the printer are effectively 16x11, it is necessary to compromise the resulting letter by squashing the data together towards the sides. As a result, some letters can appear squashed, and on bold fonts, some parts of letters may be cut off. This can be remedied by altering the references to the procedure PROCreformat (Step%, Strt%,End%). This procedure maps the 16x16 characters used by *Stop Press* on to those used by the printer. The two parameters Strt% and End% point to the Start and End columns of the section of the *Stop Press* character being converted. They can range between 0 and 15, but they must always be in sequential order. The other procedure Step% refers to the columns used on the resultant printer character. It can take a value of two or

four. With a value of four, each column on the *Stop Press* character occupies one column on the printer character. With a value of two, every two columns of the *Stop Press* character occupy one column of the printer character (the printer steps in units of half columns but cannot print adjacent dots).

The program makes three references to this procedure, the first and last of which compress the edges of the character allowing more room for the middle of the character.

Robin also provides a second program which tests the printer font simply by printing all the characters within it a little like a printer self-test routine. The procedure `PROCprint (Name$)` is the most useful part of the program as it is responsible for sending the codes to the printer and can be used appended to other programs, to allow them to make use of the new fonts. When prompted for the name of the font using this program, you should give the name of the converted font file, not the original *Stop Press* font file.

Once a font is downloaded, no special software is required to use it, other than the VDU command to select the font. The fonts do not take up any additional memory in the computer, and ordinary text printing software packages such as *Wordwise*, *View*, spreadsheets and so on can use them.

To use a font with standard programs, run the test program, but answer 'N' to the 'Test alphabet?' option. The program will then merely download the font into the printer, and select the font. As long as you don't reset or turn off the printer, you can now load *View*, *Wordwise*, or any other program and start printing in the normal fashion.

Your text will appear on the paper in the font you have chosen. Note that if your software resets the printer, for example to perform a graphics dump, or some printer drivers (notably early drivers for *View*) issue the VDU 27, 64 reset sequence, then the downloaded character set must be reselected by the command `ESC "% " 1 0`, which from Basic would be:

```
VDU 21,27,1,37,1,1,1,0
```

This can optionally, be followed by a second VDU command;

```
VDU 1,27,1,112,1,1
```

if you want proportional spacing as well, as in the test example.



Giving the Master's commands more power

£10 BASIC WITH COMMAND LINE PARAMETERS

Mr D Aylott of Buckhurst Hill, Essex, has sent a Master Series program which not only allows you to modify Basic programs so that they will run as '*' commands but also allow you to pass parameters to the program from the command line, for example `*MENU 2 3`. Five programs in total are provided on the yellow Pages – the first one assembles the required machine code file, and saves it under the name `M.CODE`. Save this as `MAKE`. The second is the code maker. This program appends the machine code to the end of the Basic program, and sets the appropriate execution addresses. Save it as `CONVERT`. The other three should be typed in and saved as `PROG1`, `PROG2` and `MENU`. Next run the `MAKE`, which will save a file called `M.CODE` to disc (ADFS users should create a `M` directory). Then set `PAGE` to `&3000` and run `CONVERT`, and convert the `PROG2` and `MENU` programs. Now `CHAIN "PROG1"` and you will find that the parameters you give are passed to `PROG2` and then displayed. You can also try the `MENU` program, typing `*MENU <argument>` where 0,1,2 and 3 are valid.

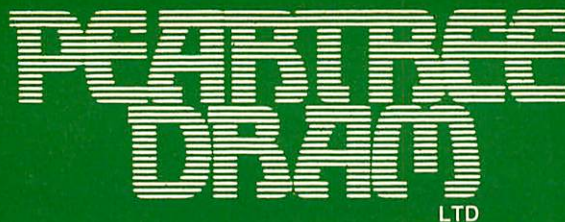
Having done this, try your own

programs. Just run them through the converter, and the resultant file can be run as a star command. If you want to pass parameters, just add them to the command line after the star command, separated by spaces. The Basic program should be written in such a way that input buffers are not cleared on entry, ie, there should be no `*FX15` or `*FX21` commands. Each program, as though it were typed from the keyboard, and so, can be picked up by `INPUT` or `GET` statements.

The way the program works is extremely simple. The `CONVERT` program appends `M.CODE` to the end of the Basic, and alters the execution address to the file to the start of `M.CODE`, so that this code runs when you type the '*' command. The machine code inserts the commands `OLD` and `RUN` into the keyboard buffer, and then scans the command line for any parameters. Any found are also inserted into the keyboard buffer, and thus are treated as 'typed' when the program starts. The machine code then exits, allowing the `OLD` and `RUN` to take effect and start the program. Note that the way the `CSINIT` command works means that the '*' command typed is inserted as the first parameter, and your program should discard or otherwise take account of this.

Finally, note that this program only runs on the Master 128 and Compact

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SCAN-LIGHT

The Hardware

Scan-Light consists of a half-width expansion board (that will fit into any Archimedes), with on board ROM software and a choice of scanners. The hand-held scanner is able to scan or digitise pictures, text, signatures, diagrams from loose pages and books at 200 dots per inch. The full width version can scan complete A4 pages of information while the half-width scanner is restricted to a scan width of 105mm (just over 4 inches).

Both scanners have a brightness control and two different scan modes—normal monochrome mode suitable for line graphics or text, and a dithered mode suitable for photographs or half tone pictures.

Scanning a document is simple, the scanner is placed at the top

of the page, the scan button is held down and the scanner dragged down the page. As it moves over the document the scanned image is shown on screen and captured in the computer's memory.

The Software

All the necessary scanner controlling software is included on a ROM as part of the interface board—it does not require programs to be loaded from disc.

The software is WIMP based and completely RISCOS compatible. This ensures it is both easy to use (all its features are controlled by menu options) and that it can multi-task with other RISCOS applications and run under the RISCOS desktop. (It is also completely compatible with the older Arthur operating system). Software features include:

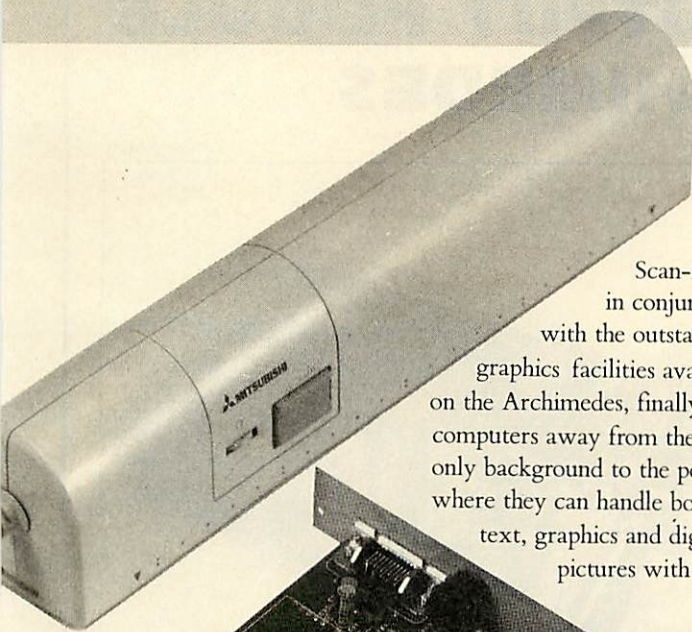
- A full page preview is displayed, as the image is scanned, showing the digitised image as the

scan progresses down the page.

- Once scanned the image is shown full size within a re-sizeable, scrollable window. The image may be magnified or reduced by any amount from 1% to 999% of original size.
- Pixel editing facilities allow individual pixels to be drawn or "undrawn".
- A variety of printer drivers is included to transfer the image to a range of dot matrix, inkjet and laser printers.
- A special grey-scale preview mode anti-aliases the scanned image to produce a true grey-level picture, allowing near photographic quality images to be obtained.
- Scanned images, or any selected part, may be saved in a variety of ways:
 - (i) As a compressed data file (saves disc space).
 - (ii) As a monochrome sprite.
 - (iii) As a 16 grey-level anti-aliased sprite.

The latter option is ideal for incorporating pictures or photographs into other programs such as Paint and Draw or any DTP program such as the Acorn DTP or Impression programs.



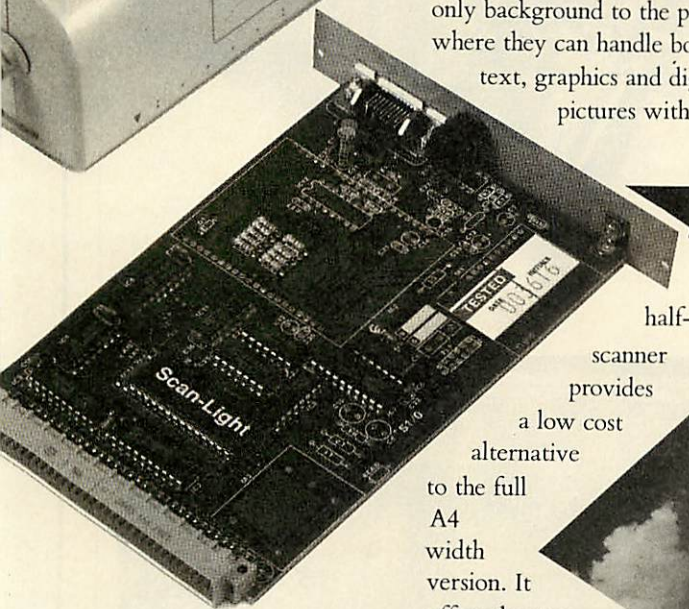


Scan-Light

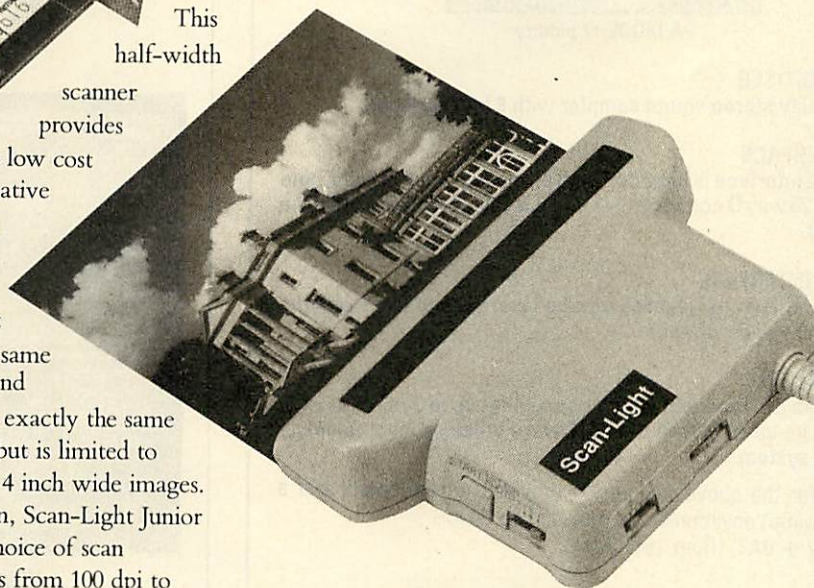
Scan-Light, in conjunction with the outstanding graphics facilities available on the Archimedes, finally takes computers away from the text only background to the point where they can handle both text, graphics and digitised pictures with equal ease.

Now you have twice the choice!

Scan-Light Junior



This half-width scanner provides a low cost alternative to the full A4 width version. It offers the same facilities and runs with exactly the same software but is limited to capturing 4 inch wide images. In addition, Scan-Light Junior offers a choice of scan resolutions from 100 dpi to ultra-high 400 dpi.



Prices

Scan-Light Junior
£189.00 + VAT for half-width scanner, interface board and software.

Scan-Light £449.00 + VAT for A4 width scanner, software and interface board.

Access and Barclaycard welcome.

Scan-Light runs on both the Arthur and RISCOS operating systems, and requires a 1 MByte machine.

Money-Back Guarantee

We offer a full, no quibble, money back guarantee with Scan-Light. If for any reason you are not satisfied with this product you may return it for a full refund. This is in addition to our normal parts/labour guarantee and our free software update service.

See us at
The BBC Acorn User Show
Alexandra Palace
21-23 July 1989
Stand No. 34/36

software for the Archimedes

The scanner, interface and ■



Computer Concepts Ltd

Gaddesden Place, Hemel Hempstead, Herts HP2 6EX
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MULTIPLE INPUT/OUTPUT PODULE FOR THE ARCHIMEDES

FED UP WITH BUYING SEPARATE PODULES?

Using surface mounted components and ultra-miniature technologies, a complete I/O system for the Archimedes has been created to fit into a half-height Eurocard.

It includes the following features:

VIDEO DIGITISER

Video digitiser for use with stationary picture sources (2 second scan in MODE 12 and MODE 15. Ideal for video recorders and cameras. This digitises to 256 levels of grey, colour is provided by an optional breakout box.



A MODE 12 picture

SOUND DIGITISER

A good quality stereo sound sampler with 8 bit resolution.

RS232 INTERFACE

A full RS232 interface is provided with all modem control lines, onto a standard 25 way D connector. +/- 10V levels are used to drive the RS232 lines.

JOYSTICK INTERFACE

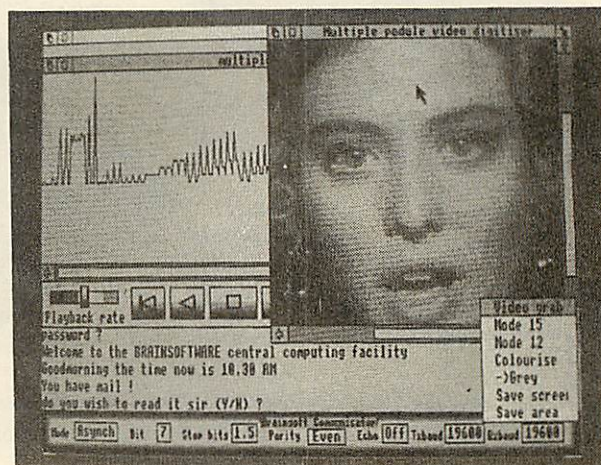
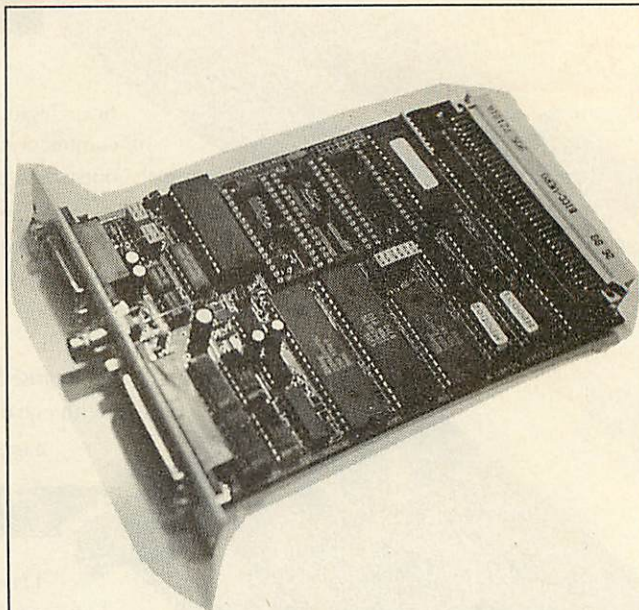
A single Dual channel joystick can be inserted and used with the standard 15 way D connector.

ROM SOCKETS

Rom sockets are provided which can accept up to 3 roms, each of which can be up to 128k in size. Software provides for a complete ROM filing system.

Software for the above features is provided on the board, and a desktop (wimp) environment is provided on disk.

Price £117 + VAT, (from 18th June).



NEW DESKTOP ENVIRONMENT

RGB TO COMPOSITE ENCODER

A product designed to interface the Archimedes RGB output to composite monitors and video recorders.
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Computer optimised and designed for ultra-reliable operation with podules designed to Acorn specifications.
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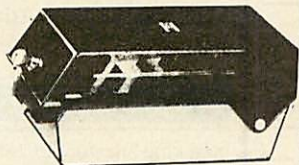
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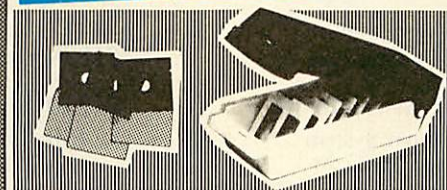
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MCL061 (2 Metres) Ribbon Cable, 26 Way IDC Socket, 36 Way Centronics Plug, BBC to Centronics Printer **£9.95**

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MCL101 (1 Metre), 7 Pin Din Plug to 7 Pin Din Plug, BBC/Electron Computer to Cassette Recorder..... **£2.95**

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All Archimedes systems are fitted with new RISC OS systems.

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310 Colour System	£1099
410/1 Base System	£1199
410/1 Colour System	£1399
420/1 Base System	£1699
420/1 Colour System	£1899
440 Base System (20Mb)	£2250
440 + Colour System	£2450
PC Emulator*	£60

*(This price applies when purchased with the computer)

carriage £12/system £8/computer

For the colour system we offer a choice between Acorn Colour Monitor (Philips CM8533) and Philips CM8833 with RGB/RGBI and Comp Video input and stereo sound facility. Every 440 System will be supplied with Acorn Developers Toolbox and a PC Emulator or first Word Plus at no extra cost.

Technomatic Special Deal

To get you going on any of the above Archimedes systems you purchase from us, we will contribute 10% of its cost towards any additional hardware or software purchase you make from us.

The following MultiScan Monitors can be supplied at special prices when purchased with a computer:

TAXAN 770+	£429(a)
MTS9600	£375(a)
CM1686 16"	£1499(a)

(for the extra HiRes modes on 400 series)

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RISCOS (enquire for delivery)	£29(b)
Fitting	£10
0.5Mb RAM upgrade (305)	£139(c)
RAM upgrade (410/420)/Mb	£179(c)
Hard Drive upgrade (410/420)	POA
2nd Floppy Drive (305-310)	£118(b)
20Mb Hard disc + Card (305-310)	£469(b)
Acorn Backplane (2 slots)	£37(c)
TechnoLog Backplane (4 slots)	£39(c)
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CC Rom Expansion Card	£45(c)
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Dual RS232 Card	£195(b)
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ARC External drive Adaptor	£30(d)
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*Requires System Delta plus	
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Ex-SERVICE EQUIPMENT

Our Service department has a number of disc drives, monitors and printers available for sale at reduced prices. Please send for detailed list.

MASTER SERIES

AMB15 Master 128 £439(a)

The Master package includes: View Word processor and Viewsheets spreadsheet software and EITHER Educational/Fun software bundle with STARdataBASE package OR A 200K 40T DS single drive TS200. Please specify your choice.

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ADJ22 Ref Manual I	£14(c)
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Video Digitiser digitises stationary picture sources (2 sec scan in modes 12&15) to 256 levels of grey. Ideal for use with video recorders and cameras.

Sound Digitiser: a highly quality stereo sound sampler with 8 bit res and four-fold over sample setting. Optional breakout box available for colour.

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Joystick interface provides a dual channel joystick connector through a 15 way D connector.

Software for all facilities listed plus full range of SWI and star command included in firmware on board. Optional breakout box to provide colour on digitised pictures to be available soon.

Multi I/O board for only £107(b)

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We can provide attractive discounts to Education Authorities, Schools, Colleges and Health Authorities. Simply phone us or write, outlining your requirements, and we will supply a quotation.

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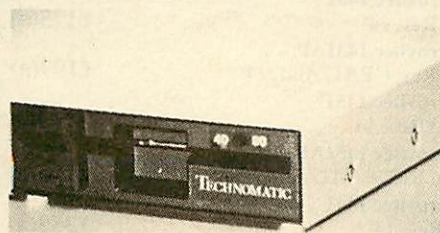
We can offer extended finance at competitive rates. If you are interested please ask for details.

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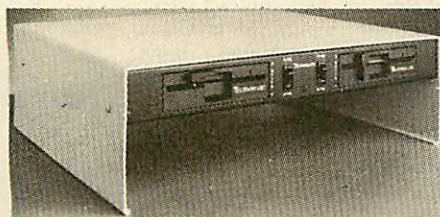
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TECHNOMATIC DISC DRIVES



TS 400



PD 800P

SPECIAL OFFER

TS200 40T DS
only **£65(b)**

(offer valid whilst stock last)

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of elegance in design, high quality of construction and use of reliable switch mode power supply units (on dual drives).

*Our plinth drives have been thoughtfully designed and provide a choice of two 5.25" drives or a combination of 5.25" and 3.5" drives. The plinth drives are designed to give a professional look to the system installation and at the same time provide considerable space saving. Their rugged construction ensures that there is no sagging under the weight of even a 20" monitor.

5.25" Single Drives 40/80 switchable:

TS400 400K/640K **£80(b)**

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PS400/PS351 are Compact/Archimedes compatible.

PD800/PD352/PD853 are Archimedes compatible.

3.5" 80T DS Drives:

TS351 single 400K/640K **£69(b)**

PS351 3.5" single drive with integral mains power supply in a 5.25" case. **£95(b)**

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For Master, B, B+ and any DFS/ADFS

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★ It is designed for easy and neat installation and takes only a few minutes to instal. Rear fixing plate is supplied in two halves so as not to interfere with existing expansion boards or those likely to be installed in future.

★ It is fully buffered and allows up to three external drives (3.5" or 5.25") to be connected.

★ Externally located toggle switch allows selecting either internal or external drive as drive 0 or drive A. This feature is particularly useful when booting up from the external drive is required.

★ AEDA is supplied configured for one internal and up to three external drives. On board options allows for reconfiguration to two internal and two external drives.

★ Other on board options allow setting 'disc eject' from the keyboard if the drive is capable of this facility.

Technomatic AEDA £30(c)

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128K RAM, 640K 3.5" DS Drive + Educ software and our bundled Educ/Fun package included

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with 14" Col Monitor **£475(2×a)**

2nd Drive Kit **£90(c)** Serial Kit **£25(d)**

Mertec Adaptor **£35(c)** TV Modulator **£26(d)**

Ext Drive Adaptor **£9(d)** Printer Lead **£7(d)**

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Single Winchesters, housed in attractively styled metal enclosures in BBC matching beige colour are fan cooled and powered by switch mode power supply for quiet, efficient and reliable operation.

Winchester/floppy combination drives, housed in our elegant plinth housing.

To get the most from the Winchester, the following utilities are installed on the drives:

★ TREE PLAN: A utility to create an organised directory structure and display it on the screen or dump it to a printer.

★ Formatter and verify program.

★ For Master users our popular front end utility to display the entire contents of the drive in icon format. Files can be loaded simply by pointing at the icons.

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P304HP* 30Mb Winchester + 640K DS 40/80T floppy £609(a)

*(mounted in plinth type casing)

Larger drives available on request.

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DNFS ROM **£19(d)** 1770 DFS Kit **£49(d)**

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ATPL Board for Model B. Simple

to instal, no soldering. Allows

expansion to 15 Roms + 2*8K RAMS **£37(c)**

ATPL Battery backup kit **£18(d)**

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5.25" Discs in packs of 10

744 40T SS DD **£6.50(d)**

745 40T DS DD **£7.00(d)**

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(Add £1 for library case packing)

3.5" Discs in packs of 10

80T SS DD **£10.00(d)**

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Voucher for free Quartz wrist watch with every purchase of 5 packs of 3M discs whilst stocks last.

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50 5.25" 40 T single sided discs with sleeves

in lockable box. **£20(b)**

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27128-25 (12.5vVpp) **£4.50** 27128-25 (21vVpp) **£6**

27512-25 **£9** 6264LP-15 **£6**

These prices subject to change (Carriage code d)

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FX850	£295	LQ850	£415
FX1050	£395	LQ1050	£569
EX800	£429	LQ2550+	£919
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KXP1124	£269
KXP1540	£435

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Hitachi 672XD A3 4 col	£479
Plotmate A4S	£379
Plotmate A3M	£549

Roland A3 FLATBED PLOTTERS

DXY880A	£525	DXY1100	£625
DXY1200	£865	DXY1300	£1025

All above items are carriage (a).

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NatPan KXP17	£39(d)	Taxan	£49(d)

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MX/RX/FX100, FX105/1000/1050	£6(d)
LQ500/800/850	£5(d)
LQ1000/1050, EX800/1000 (Black)	£8(d)
EX800/1000	£16(d)
LQ2550, JX80	£13(d)
StarLC10/NL10, NatPan KXP1081	£4(d)
LC10 Colour	£6.50(d)
Taxan 810/815/910/915	£5.75(d)
Integrex Black Cartridge	£8(d)
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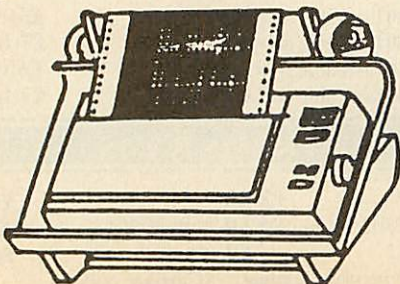
LX800	£70(b)	LQ500	£75(b)
FX/LQ/800/850	£135(b)	FX/LQ1000/1050	£179(a)
EX800	£150(b)	EX1000/LQ2500	£210(a)
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LQ800	£44(b)	LQ1000	£55(b)
LQ850	£70(b)	LQ1050	£85(b)

PRINTER STAND

A new style printer stand with easy paper feed and paper separation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. £26 (b)



STAR

LC10	£169	LC10 Col	£215
LC24-10	£275	NB24-10	£449

TAXAN

KP815	£155	KP915	£275
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NEC

P2200	£269	P6+	£439
		P7+	£579

HP

Laserjet Series II Laser	£1349
Deskjet	£520

BUFFERS & SHARERS

TSB 256 Auto Sharer/Buffer

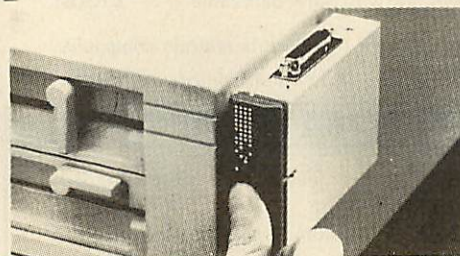
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facilities. Full spec on request. £169(a)

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256K parallel buffer with facilities for 256 copies. PAUSE, RESET & SELF-TEST £149(b)

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A economical solution for connecting two computers to one printer or one computer to two printers. Easily attaches to the side of compute or monitor (specify parallel or serial) £21(c)



Manual Printer Sharers:

(All lines are switched).	Parallel	Serial
2 computers to one printer	£23(c)	£23(c)
3 computers to one printer	£30(c)	£30(c)
4 computers to one printer	£36(c)	£36(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable	£15(c)
--	--------

Parallel Printer Leads

BBC/Master (1.2m)	£5(d)	BBC/Master (2m)	£7(d)
Archimedes (2m)	£7(d)	Compact (1.2m)	£7(d)

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Plain fanfold paper with microperforations:

2000 sheets: 9.5" x 11"	£11(b)
14.5" x 11"	£18 (£4.50)
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100 sheets A4 OHP film	£45(b)
Labels/1000	
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Triple Row 2 1/4" x 1 1/4"	£5(d)

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MIRACOM WS3000 V22bis	£395(b)	MAYA (B/B+/M/Arc)	£49(d)
PACE LINNET V21/23	£129(b)	Commstar II (B/B+/M)	£28(d)

All modems carry a BABT Approval

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12", 14" and 20" MONITORS

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Std Res, 14"	
Microvitec 1431AP	£199(a)
Std Res + PAL/Aud, 14"	
Microvitec 1451	£219(a)
Med Res, 14"	
Microvitec 1451AP	£255(a)
Med Res + PAL/Aud, 14"	
Microvitec 1441	£359(a)
Hi Res, 14"	
Dust Cover for Microvitec 14" monitors	£5.50(d)
Philips 8833 14" RGB	
Med Res, 14", high contrast screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast.	£219(a)
Touchtec 501	£239(a)
Acorn Philips	
14" Colour Monitor	£199(a)
Microvitec 2030CS	
20" Standard Resolution RGB/Comp Video	£380(a)
Microvitec 2040CS	
20" High Resolution RGB/Comp Video	£675(a)
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12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£269(a)
TAXAN 770+	
MultiSync Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand	£449 (a)
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Enhanced version of the original NEC MultiSync, complete with tilt & swivel base. Suitable for Archimedes and PC compatibles.	£459(a)
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Fully compatible Archimedes/PC Compatible systems complete with tilt and swivel stand	£399(a)

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Hi Res green screen	
PHILIPS BM 7522	£79(a)
Hi Res amber screen	
Tilt & Swivel Stand for Philips Mono	£6(c)

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VIEW 2.1	£35(d)
VIEW 3.0	£45(c)
Double View Disc	£15(d)
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WORDWISE	£24(d)
WORDWISE PLUS	£38(d)
INTERWORD	£36(d)
SPELLMASTER	£42(d)
EDWORD II	£39(c)
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Windomatic	£15(d)
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Screen Print	£25(d)
(a powerful printer dump utility)	
Printmaster	£24(d)
(Versatile utility for Epson printers)	
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Printer drive for any printer, compatible with View, WW, Interword.	
On Screen display of the actual typescripts/fonts chosen.	

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DNFS ROM	£17(d)
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Drive Power Cable Single £3(d) Dual	£4(d)
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UVI Eraser: Compact eraser in smart case, can erase six eprom at a time. Safety cut out switch ensures no exposure to UV rays when the carrier tray is drawn out. **£47(c)**

UVIT Easer: As above but with a built-in timer so that you do not have to worry about over exposure and damaging the eproms. **£59(c)**

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(pse specify Compact or 1770DFS)	
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Book £6.95(d) Disc/Aud (2)	£7(d)
Black Queen (1770DFS)	£13(d)
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Above Programs are suitable for BBC B, B+ & Master	

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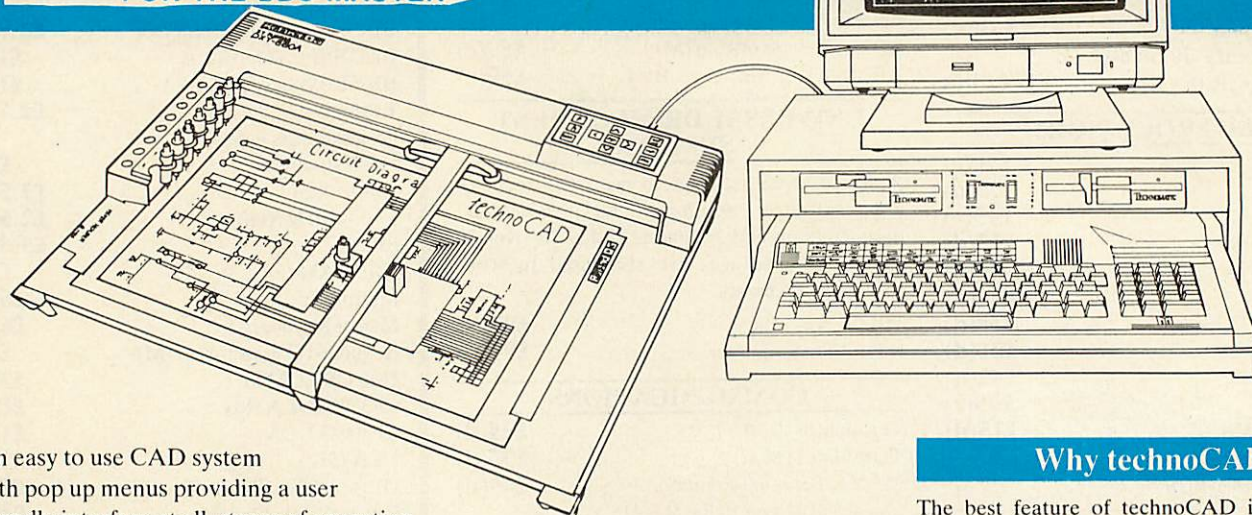
All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.

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technoCAD

COMPUTER AIDED DRAUGHTING
FOR THE BBC MASTER



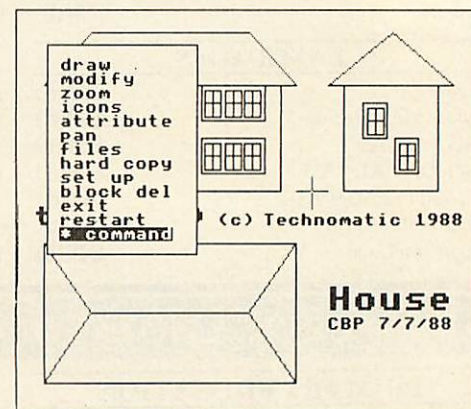
- ★ An easy to use CAD system with pop up menus providing a user friendly interface at all stages of operation.
- ★ Input can be configured for keyboard, mouse or tracker ball. Only three keys to input all commands if input from keyboard.
- ★ Virtually no limit to the size or complexity of the drawing that can be created. Powerful zoom facility allows a A0 size drawing to be viewed from single screen or a single screen can be enlarged to A0 size. Continuous panning across a drawing by specifying co-ordinates.
- ★ Lines, arcs and circles can be drawn with ease and in user defined colour and thickness. These can be modified at any stage of drawing.
- ★ User definable grid and scale, together with on screen display of dimensions, and co-ordinates enable easy and accurate drawings.
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- ★ Powerful icon utility allows any shape or drawing to be saved to a library as an icon. Icons can be recalled from the library and placed anywhere on the screen drawing at required scale and orientation.
- ★ Toolkit program allows customisation of files, utilities and peripherals.

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Why technoCAD

The best feature of technoCAD is not its outstanding performance, not its unique ability to allow creation of complex icons, not the quality of output from printers or plotters. The best feature is the unprecedented ease with which it can be mastered. With easy to use single key commands limited to three keys, pull down menus and a clear and concise, easy to read manual, technoCAD is truly the system any one can use. technoCAD will meet the needs of most professional applications and is an ideal tool for teaching CAD in technical schools, CDT departments and colleges.



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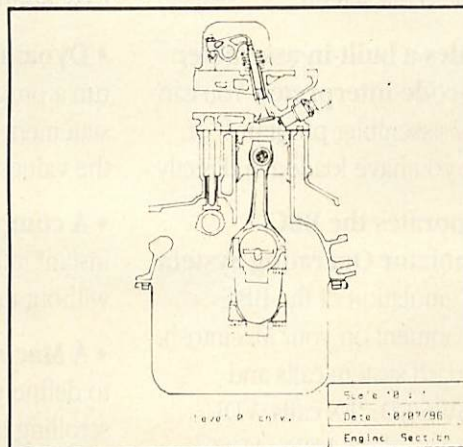
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Novacad can drive a plotter to produce drawings of highest quality...
Novacad is excellent. It is flexible, genuinely easy to operate
without much practice, and a pleasure to use. Beebug Dec 86

A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.



Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

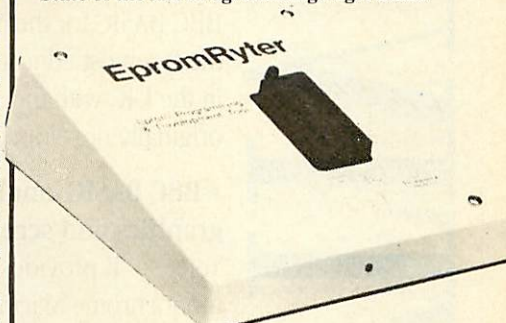
- ★ Simple and easy to use with logical command sequence.
- ★ A large drawing area (approx 15 screens)
- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
- ★ Zoom facility.
- ★ Create multi level drawings.
- ★ Text entry at any 90° orientation anywhere on the screen.
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers
- ★ Cursor control from keyboard/tracker ball/mouse.

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NOVACAD T/M Version **£49(d)**
NOVACAD T/M + Plotter DG **£61(c)**
Plotter Driver Generator **£15(d)**

EpromRyter

- *Highly sophisticated & Advanced Programmer
- *All current single rail eproms handled
- *State of the Art Programming Algorithms



EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:

- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXXA

£89(b) + VAT

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request. **£89(b)**

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- **BBC BASIC provides a built-in assembler and 6502 machine-code interpreter.** You can compile and run 6502 assembler programs, or machine code which you have loaded in directly.

- **BBC BASIC incorporates the BBC Microcomputer Emulator Operating System – BEOS –** to give full emulation of the BBC Microcomputer environment on your Macintosh, including all the standard system calls and vectors, OSBYTE, OSWORD, *FX calls, VDU codes, function keys, sound, and DFS/ADFS commands.

- **BBC BASIC includes the File»Mac transfer utility** which will transfer programs and data files between the BBC Microcomputer and Macintosh. Even !BOOT files can be transferred, and can then simply be double-clicked to run programs.

...with all the advantages of the Apple Macintosh:

BBC BASIC takes advantage of the advanced features of the Macintosh to provide a fast and powerful environment in which to develop, test, and run your BASIC programs.

- **A Macintosh-style interactive editor** provides a scrolling view of program listings with convenient cursor or mouse editing. You can work with any font available on your system and you can display keywords highlighted in bold for easy reference.

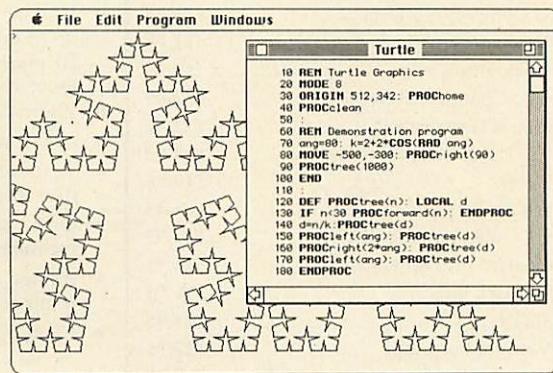
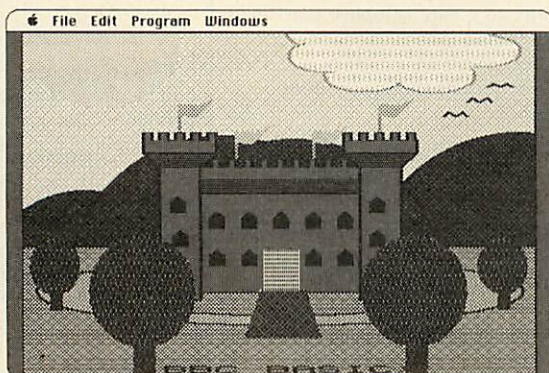
- **Dynamic tracing and debugging** lets you run a program, or step through, highlighting each statement as it is executed, and you can display the values of any variables or expressions.

- **A comprehensive Help system** gives you instant information on keywords and operators, without interrupting what you are doing.

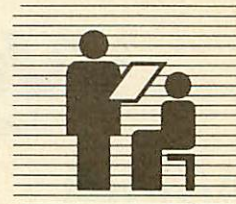
- **A Macintosh Toolbox interface** allows you to define your own menus, dialogue boxes, and scrolling lists using convenient BASIC keywords, and use the standard file dialogues for opening and saving data files.

The BBC BASIC package contains:

- One 800K disc containing BBC BASIC, File-Mac, and example programs
- BBC BASIC User Guide
- BEOS Reference Guide
- BBC BASIC Examples booklet



TopClassTM Curriculum

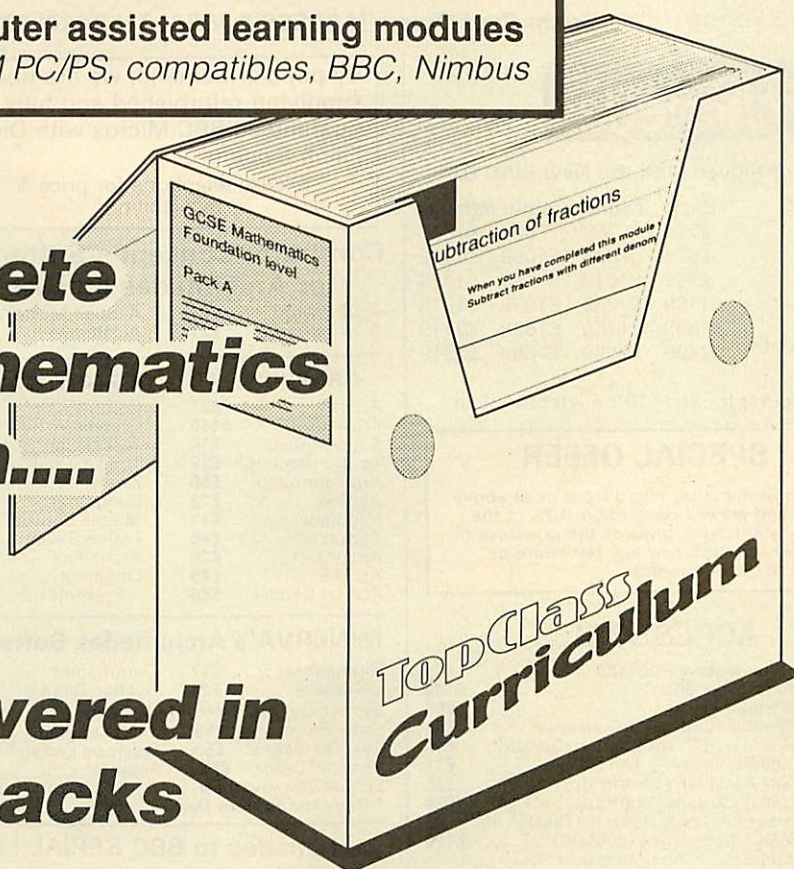


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**The complete
GCSE Mathematics
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Product summary & Order details

GCSE Mathematics Curriculum Product List

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FCCM5	Intermediate Level Maths Pack B
FCCM6	Intermediate Level Maths Pack C
FCCM7	Higher Level Maths Pack A
FCCM8	Higher Level Maths Pack B
FCCM9	Higher Level Maths Pack C

TopClass Curriculum versions available for the IBM PS/2 range, PC compatibles such as Amstrad PC, the BBC micro and the RM Nimbus

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Jessa House, 250 Lower High Street, Watford WD1 2AN, England

Tel: Watford (0923) 37774 Tlx: 8956095 Fax: 01 950 8989

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The choice
before and after
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Acorn
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of Experience

Archimedes *micro*

Now supplied with the New RISC OS

System	Basic	Mono	Colour	Multiscan
305	£725	£785	£924	£1869
310	£899	£859	£1098	£1318
310M	£959	£1019	£1158	£1379
410/1	£1199	£1259	£1398	£1619
420/1	£1699	£1759	£1898	£2119
440	£2499	£2559	£2698	£2919

(Securicor carr. £10 on Archimedes)

SPECIAL OFFER

Buy an Archimedes micro from us at above prices and we will contribute 10% of the money you spend, towards the purchase of a printer, disc drive or any Hardware or Software of your choice.

ACCESSORIES

● NEW Multitasking RISC OS	£29
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● ROM Podule (Computer Concepts)	£45
● ROM Podule (C.C.) with Battery Backup	£59
● 2 Podule Backplane + Fan (Acorn)	£37
● 2 Podule Backplane (Watford)	£25
● 4 Podule Backplane (Watford)	£38
● Backplane FAN only (for Hard Disc)	£9
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● MIDI Expansion Card	£65
● Sound Sampler (Armadillo)	£129
● Chromalock Podule	£280
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● Archimedes IEEE Interface Adaptor	£269
● Dual RS232 Podule	£195
● 16 bit parallel I/O Card	£195
● PC Emulation Pack incl. MSDOS 3.21	£65
● Archimedes Reference Manual	£29
● Arm Assembly Lang. Prog. Manual	£15
● Archimedes BBC Basic Guide	£20

RISC OS Now available from stock

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By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System

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Artisan	£31	Gamma Plus	£60
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ArcTFS	£25	Linguinity	
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Sigmasheet	£57	Gammplot	£57
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Order Processing*	£53	Sales Ledger*	£53
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* Requires System Delta

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.

Only £15

Archimedes 5 1/4" / 3 1/2" Disc drive Interface

With this interface it is possible to connect almost any 5 1/4" / 3 1/2" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

Watford's 20Meg & 40Meg Archimedes Hard Disc

Watford Electronics' 20Meg & 40Meg hard disc fits internally into the Winchester slot provided. It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). Price includes the Hard Disc Drive, Controller Podule & fitting instructions.

P.S. This upgrade requires a backplane and a fan.

Arch HD20 - 20Meg Hard Drive	£379
Arch HD40 - 40Meg Hard Drive	£425
Backplane for 2 Podules	£25
Backplane for 4 Podules	£38
Slimline Quiet Extractor Fan	£9

CREDIT TERMS now available.

In these days of expensive borrowing, we have negotiated a special deal for our customers, which allows us to offer you, low cost finance scheme at 12.25% per annum, typical APR 25.5%. For further details please telephone or write in.

LANGUAGES (Archimedes)

ANSI 'C'; ISO-PASCAL; FORTRAN 77; all Release II.	£94 each
Cambridge LISP; PROLOG X	£181 each
LOGOTRON LOGO	£55
BASIC Compiler	£89
Archimedes Assembler	£189
TWIN EDITOR	£27

BBC MASTER

MASTER 128K Micro incl. Acorn's: View, Viewsheets, ADFS, BASIC Editor & TERMINAL plus £35 worth of FREE OFFER (see below) **£439**

FREE . . . £50 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control, and the popular, Master Advanced Reference Manual. With every BBC Master purchased from us this month.

BBC Master with Turbo Board + above SPECIAL OFFER **£535**

Securicor Carriage on Micros £7

ADD-ONS & ACCESSORIES

Turbo 65C102 Add-on Module	£118
Econet Module for the Master	£49
Twin ROM Cartridge for Master	£8
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Master Reference Manual I (No VAT)	£14
Master Reference Manual II (No VAT)	£14
Master Advance Ref. Manual (No VAT)	£18
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£49
ECONET Upgrade Kit for BBC	£42
ALL ECONET UPGRADES Available	
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Ecolink	£270

BBC MASTER COMPACT

System 1	Standard Package	£305
System 1A	System 1 + TV Modulator	£329
System 2	System 1 + Green Hires Monitor	£359
System 3	System 1 + Medium Res Colour Monitor	£469
RS232 Kit for BBC Compact		£25
Additional 3 1/2" Drive for BBC Compact (Securicor carriage £10)		£90

65C102 2nd PROCESSOR

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

£159

Archimedes A3000 Micro



This new A3000 Archimedes is overall smaller, faster and more affordable. It is supplied with RISC OS, 8MHz ARM processor and 1MB of memory. The neat one box design incorporates a single 3.5" disc drive, parallel printer interface, sound and video outputs, and a mouse.

Price: £649

Please telephone or write in for technical brochure.

0% FINANCE

We are once again able to offer 0% finance for the purchase of an Archimedes Micro. For further details please write in or telephone 0923 37774 ext 203.

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

CO-PRO Adaptor



With this Watford's Co-pro Adaptor unit, you can now attach any BBC Master's coprocessors to your original BBC B.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K add-on your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro Adaptor to add a second Co-processor externally. Watford, brings power to your BBC at only:

£35 (carr £5)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

NEW

The Complete Mouse User Guide to BBC Micro

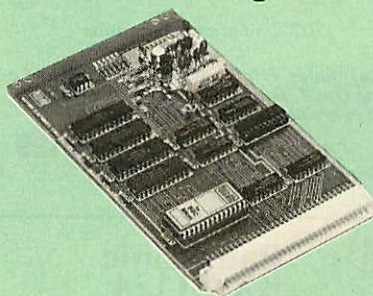
This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price **£5.95 (No VAT)**

Example programs on Disc **£4.95**

Archimedes Real-Time Digitiser



Watford's Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squashed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

SOFTWARE

All driver software for the digitiser is contained in a ROM on the podule. Software facilities are accessed via operating system star (*) commands and SWI calls. A Utility Disk is included containing sample pictures, examples and Utility programs.

RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2, 16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Price £249

Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

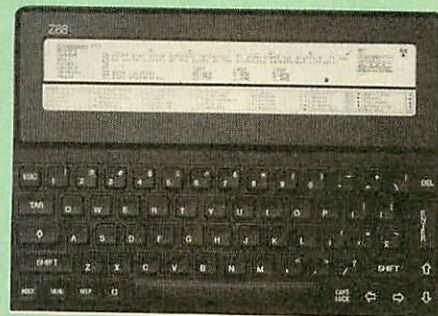
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: £165 (carr. £7)

Z88 Sinclair's Portable Micro



The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

Only: £199

FREE

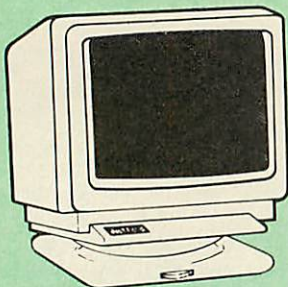
With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

Mains Adaptor	£8.65
32K RAM Pack or 32K EPROM Pack	£17.35
128K RAM Pack or 128K EPROM Pack	£43.40
512K RAM Pack	£169
Z88 Spellmaster for Pipedream	£51
Z88 to BBC Link	£22
Z88 to PC Link II	£30
Z88 to Macintosh	£49
Z88 EPROM ERASER	£34.75
Serial Printer Cable	£8.65
Parallel Printer Cable	£24.00
Z88 Modem	£145
Z88 Soft Carrying Case	£8.50
Sinclair Z88 Computing Book	£9.95
AA Nicad Rechargeable Battery	£1.50
Battery Charger, Compact & Fast (3 Hours)	£6

Continued

MONITORS



All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

- 1431 - Standard resolution as used on the BBC television computer programme £175
- 1451 - Medium resolution, suitable for word processing in mode 0 £219
- 1441 - High res, exceeds the capabilities of the BBC micro £359
- 1431AP RGB + PAL and AUDIO £199
- 1451AP RGB + PAL and AUDIO £255
- 2030 CS 20" Med Res £380
- 2040 CS 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- Touchtec 501 Touch Screen £239

14" MULTISCAN COLOUR

- TAXAN Multisync 770 Plus £439
- TAXAN Multiscan 870 16" Monitor £499
- EIZO 9060S Super High resolution multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch £458

TAXAN 12"

- Super Vision 2 Type 620 Hi-res RGB Colour, Green/Colour Switch £265
- Super Vision 3 - Type 625 Super Hi-res RGB Colour, Green/Colour Switch £315

PHILLIPS

- BM7502 12" Hi-res Green Monitor £65
- CM8833 14" Med. Res Colour Monitor £219

STAR BUY

- PHILLIPS 14" Medium Res, dark glass, attractively finished Colour Monitor - supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £199

Dust Cover for Phillips Monitors £6

SPARE LEADS

BNC Lead for Zenith or Philips £3
Skart Monitor Lead £5
RGB lead for TAXAN Monitors £3
Archimedes Colour Monitor Lead £7.50

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors £8 (carr. £2.50)

for 14" Monitors £12 (carr. £2.50)

PLOTTERS

- Plotmate A4S £379 ● Plotmate A3M £549

Roland Plotters

- DXY 880A £560 ● DXY 1100 £630
- DXY 1200 £879 ● DXY 1300 £1035

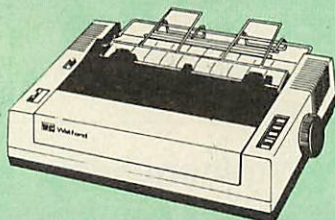
TAXAN KP-815 PRINTER

Offer Price £155

Taxan KP915 132 Column £275

- RS232 Interface £49
- RS232 Interface with 2K Buffer £69
- RS232 Interface with 16K Buffer £89

Panasonic KX-P1081



UK's most popular printer.

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

SPRING SALE OFFER only: £139

Optional RS232 Interface: £39

NEW

Panasonic KX-P1124

Watford Electronics, your authorised Panasonic Premier Dealer, brings you from the prodigious Panasonic Stables, this fabulous 24-pin printer.

Available NOW at a superbly realistic price, KX-P1124 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

At less than 53dB, this is perhaps the quietest dot matrix printer on the market.

Watford's Launch Offer: £269

Panasonic Printers

- KX-P1180 9pin 80col. 192/38 CPS £169
- KX-P1540 24pin 136col. 240/80 CPS £435
- KX-P1592 9pin 136col. 216/45 CPS £275
- KX-P1595 9pin 136col. 288/61 CPS £355

- Panasonic KX-P4450 LASER PRINTER
Latest technology at Watford's special offer price £1,499
- Spare Toner £29 ● A4 Feeder £55
- Drum Unit £149 ● Developer £115

Panasonic Accessories Cut Sheet Feeders

- KX-P1592/1595 (P32) £175; KX-P1540 (P35) £185
- KX-P1124 (P36) £88; KX-P1180 (P37) £79

BUFFERS

- P12 4K Buffer Board for 1081 £55
- P42 32K Buffer Chip for 1592/1595 £49
- P43 32K Buffer Chip for 1540/1124 £49

Serial Interfaces

- P17 P1081/1592 £32 P19 P1124/1180 £55

Original Panasonic Ribbons

- Guaranteed to last 3 million characters
- P110 for KX-P1081; 1592 & 1595 £8
- P115 for KX-P1180 £8 P145 for KX-P1124 £8
- P140 for KX-P1540 £10

INTEGREX COLOUR JET

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £16.50
- Black Cartridge £10.35
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

NEW - Intergrex COLOURCEL NPQ Ink Jet Colour Printer £2,695

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS - 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

£269

- Pinwriter Serial Interface (optional) £55
- P2200 Cut Sheet Feeder £59
- Additional Font Cartridge £25
- NEC P2200 Pinwriter Ribbon £6
- NEC Ribbons for P6 £8; P7 £9.50

NEC PINWRITER P6/P7 Plus

- NEC P6+ 80 columns £439
- NEC P7+ 136 columns £575
- Colour Option £74
- Serial Interface £73
- Cut Sheet Feeder £125

Star Printers

- Star LC10 £169 LC10 Colour £215
- Star LC24-10 £279 NB24-10 £449
- LC10 Colour Ribbon £6 Cut Sheet Feeder £65

Brother HR20 DaisyWheel Printer £339

EPSON PRINTERS

- EX800 £410 LQ850 £430
- EX1000 £564 LQ1050 £570
- FX850 £315 LQ2550 £925
- FX1000 £425 LQ2500+ £839
- FX1050 £439 LX800 £169
- LQ500 £275 SQ2500 £975
- GQ3500 Laser £1150

CUT SHEET FEEDERS for

EX800 £149; FX800/LQ800 £149; FX850/LQ850 £149; FX1000/LQ100 £179; LQ500/LX800 £79; LQ500 £75; LQ1050 £175.

TRACTOR FEED for

LQ800 £44; LQ850/FX850 £69; LQ1050/FX1050 £85; LQ2500 £90; LQ2550 £90

ACCESSORIES

- EX800/1000 Colour Option £55
- EX800/1000 Colour Ribbon £18
- LQ2500 Colour Option £65

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

- All these interfaces fit inside the printer.
- RS232 £32 RS232 + 2K Buffer £52
- IEEE 488 £40 RS232 + 8K Buffer £79

PRINTER LEADS

- 3BC Centronics 4' long £5
- BBC Centronics 6' extra long £7
- Compact's Special Centronics Lead £7
- Archimedes Printer Lead 1 meter £6
- Nimbus Centronics Lead £12
- IBM Parallel Lead 1 meter £6
- Double Ended 36 way Centronic Lead 4' £7
- Double Ended 36 way Centronics Lead 6' £9
- MSX Centronics Parallel Lead 4' £12
- RS232 Leads (Various) P.O.A.

RS-232 GENDER CHANGERS

- Male to Female £4.95
- Male to Male £4.95
- Female to Female £4.95
- 25 way Male to 9 way Female £4.90

Listing Paper (Perforated)

● 1,000 Sheets 9½" x 11" Fanfold Paper	£7
● 2,000 Sheets 9½" x 11" Fanfold Paper	£12
● 1000 Sheets 9½" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1000 Sheets true A4 Fanfold Paper 70gms	£11
● 2000 Sheets true A4 Fanfold Paper 70gms	£19
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

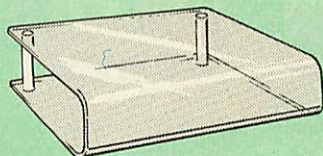
Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25
Carriage on 1,000 Labels £1.00	

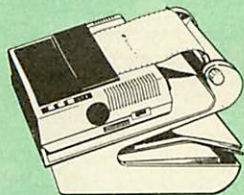
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

Only: £16 (carr. £3)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-feed compartments i.e. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

tions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)

132 Column version £26 (carr. £3)

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	—
BBC Micro	—	£3.50
BBC Master	—	£4.00
Archimedes Micro pair	—	£9.00
IBM PCs pair	—	£6.00
RX/FX80/MX80	£3.00	—
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£7.50	£5.00
RX/FX80/85/800/MX80	£3.90	—
RX/FX100/1000	£5.75	—
Kaga/Taxan KP810/815	£4.90	£4.00
LC10 (Black)	£4.25	£5.00
LQ500/800	£3.75	£5.00
LQ1050/LQ2500	£8.50	£5.50
LX80/86/800	£3.80	£4.50
M1009/GLP	£3.80	£3.75
Panasonic KX1080/81	£4.00	£4.75
SQ2500	£23.00	£5.50
Star NL10	£3.75	£4.50
Olivetti Ink Jet	—	—
Cartridges (set of 4)	£9	—

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

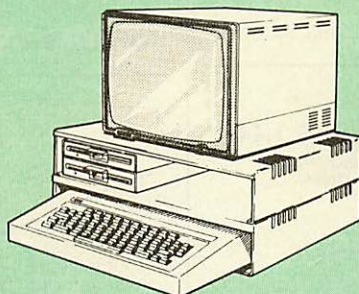
Universal Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables. (Ideal for School environments.)

Connects	Serial	Centronics
2 to 1	£20	£22
3 to 1	£27	£30
5 to 1	£36	£39

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS

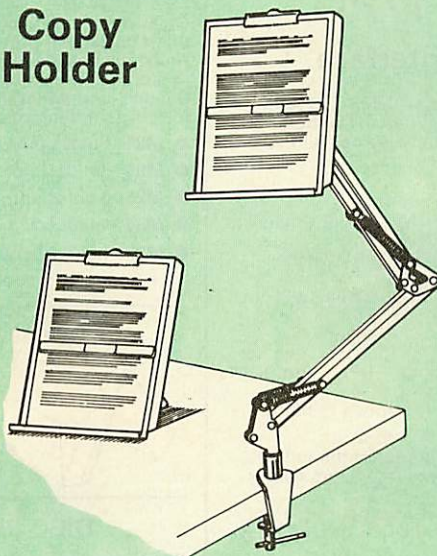


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	£12
Double BBC Plinth	420 x 310 x 210mm	£20
Printer Plinth	420 x 310 x 105mm	£12
Single Master Plinth	490 x 310 x 105mm	£13
Double Master Plinth	490 x 310 x 210mm	£24
(Carr. Single plinth 12; double plinth £3)		

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top £7 (carr. £3)
Angle poise £12 (carr. £3)

NEW

Handy 2 Way Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	£20
Compact AB Switch RS232	£19

(Cables extra at £6 each)

MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world 38mm x 130mm x 134mm.

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

Only £149 (carr £5)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities — he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

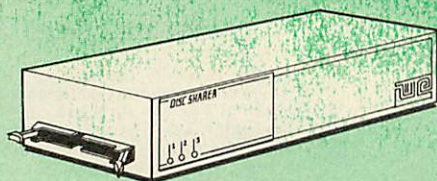
£5.95 (No VAT)



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65**

Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

WATFORD's & ACORN's DFSs

Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)

- Watford's sophisticated DFS ROM only **£16**
- We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only **£12**
- DFS Manual (Comprehensive) (no VAT) **£6.95**
- DNFS ROM only **£17** ● ADFS ROM only **£25**

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

NEW

Watford's MkII 1770 Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£123** (£7 carr) (Offer valid while stocks last)



3 1/2" DISC DRIVE OFFER

These top quality 3 1/2" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- CLS35 400K Unit **£69** ● CLD35 800K Unit **£125**



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17 X disc interface).

- 30 Megabyte BBC Hard Disc **£405** (carr £9)

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3 1/2" & 5 1/4", please specify.

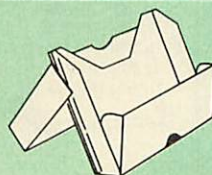
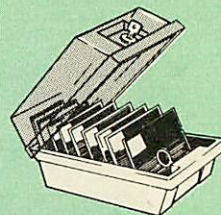
£4

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 – holds upto 50 5 1/4" discs **£4.95**
- M85 – holds upto 95 5 1/4" discs **£6.95**
- M25* – holds upto 25 3 1/2" Discs **£4.95**
- M50 – holds 50 3 1/2" Discs **£6.50**
- M10 – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5 1/4" Discs. Only **£2.00**

DISC PLONKER RACK

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds upto eight 5 1/4" discs.

Protection at Only: **£2**



DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket. **£4**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

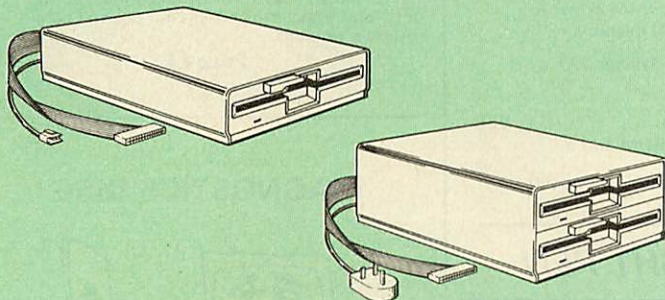
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £10. (At Watford we anticipate your needs of tomorrow, not just today!)

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £79	CLD 400 £168	CS 400S £89	CD400 £188
800K (1.44M)		CLD 800S £159		CD 800S £169

● TWIN Disc Drive Case, complete with Power Supply & Cables £43
Securicor carriage on Disc Drives £5 to £6

Prefix C = Cased Drive
L = Less PSU
S = Single
D = Double

Suffix S = 40-80 Switchable

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12

Special Cable to connect both 3½" and 5¼" Disc
Drives simultaneously to the BBC Compact £13

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● 10 × 5.25" S/S D/D 40 Track Diskettes (744)	£6.00
● 10 × 5.25" D/S D/D 40 Track Diskettes (745)	£7.00
● 10 × 5.25" S/S D/D 80 Track Diskettes (746)	£11.50
● 10 × 5.25" D/S D/D 80 Track Diskettes (747)	£11.00
● 10 × 5.25" 1.6M D/S D/D High Density Discs for IBM XT and AT	£16
● 10 × 3.5" S/S D/D 40/80 track Discs	£10.00
● 10 × 3.5" D/S D/D 40/80 track Discs	£11.75
● 10 × 3.5" High Density Diskettes	£25

FREE
Designer
Watch
OFFER

Purchase any 5 packs of the above 3M Diskettes from us during the months of May & June '89, and qualify for a FREE 3M's attractive Black Designer's watch. (Offer subject to availability)

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● 10 × M3 3.5" D/S D/D 80 Track Discs	£10
● 10 × M9 3.5" Double Side High Density	£25
● 10 × M4 5.25" S/S D/D 40 Track Discs	£5
● 10 × M5 5.25" D/S D/D 40 Track Discs	£7
● 10 × M7 5.25" D/S D/D 80 Track Discs	£9
● 10 × M8 5.25" D/S H/D Hi-Density Discs	£14
● 3" Double Sided Discs	£2.50 each

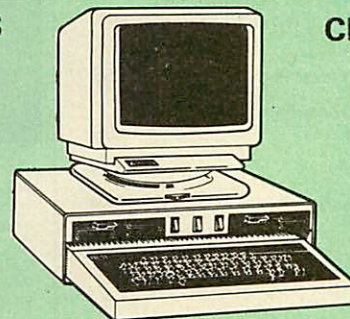
Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

DP35-800S



CDPM800S

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC & Master £182

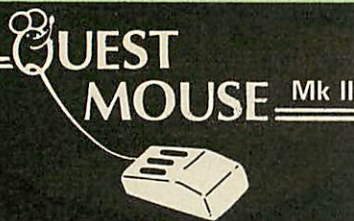
DP35-800 for BBC/Master £165

(For DP35-800S spec. see Page 2 of our advert)

(Securicor Carr. £7)

(The above drive units are
2 Megabytes unformatted)

Continued



The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

- Quest Mouse II & Quest Paint **£58**
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont **£89**
- Quest Mouse II only **£29**
- Quest Paint Software only **£34**
- Quest Font Disc **£15**
- Quest Mouse Mat (Red or Blue or Green please specify) **£3**
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only **£22**
- GXR ROM for the BBC Micro **£22**

(P.S. Quest Paint is not compatible with BBC Compact)

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

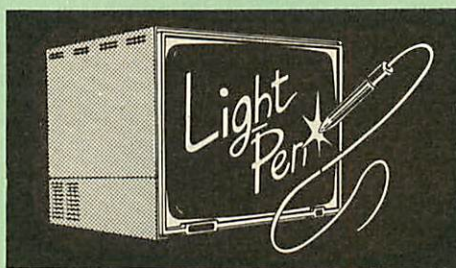
- Pick filenames off the screen for loading and saving.
- Rotate a cutout to any angle and Distort it to any four sided shape.
- Has Built in Font editor.
- Default brushes and patterns on startup.
- 16 x 16 font available on start up.
- Ability to reset patterns, fonts and brushes to default at any time.
- ROM based enhanced Epson and compatible printer dump.
- ROM based enhanced extended picture routine.
- Ability to create and abort extended pictures.
- Improved disk access speed for extended pictures.
- User definable sideways RAM driver for incompatible sideways RAM systems.
- Ellipses at any angle on Master 128 (or B with GXR ROM).

ConQuest ROM Package **£30**

(Price includes software in ROM and a comprehensive Manual).

(Not Compatible with BBC Compact)

MARK II LIGHT PEN



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

FLEET STREET EDITOR

- Software pack for BBC Micro **£33**
- Software pack for the Master **£39**
- Software Pack for Compact **£40**
- Admin Xtra Disc Utility **£13**
- Walt Disney Disc Utility **£13**
- Fonts N Graphics Disc Utility **£13**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)
RB2 including Quest Paint

£45
£75

THE NEW Mk III AMX MOUSE

ONLY: £59 Inc. Super Art package
(carr £3)

(Please specify for BBC, Master or Compact)

- MOUSE MAT **£3**
- AMX MOUSE ONLY **£29**
- AMX UTILITY Package **£13**
- AMX SUPERART Package **£34**
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse **£32**

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker **£13**

- AMX DESIGN (ROM) **£55**
- AMX XAM Educational **£15**
- AMX EXTRA EXTRA **£16**
- AMX MAX A gem of desktop (ROM) **£15**

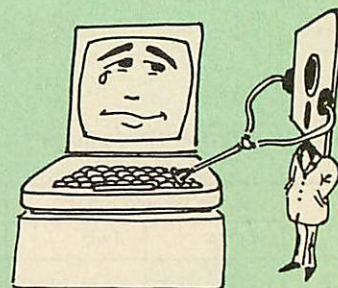
NEW

WE MOUSE HOUSE

Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, Monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4

DIAGNOSTICS DISC



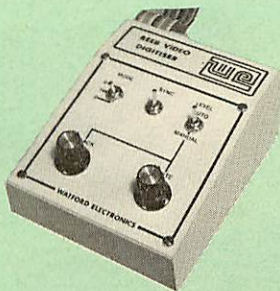
The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb: RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER



"Test Bureau Approved for
Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced 'contouring', resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out. The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)



Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K Rom contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this facility alone. This must surely be the graphics.

WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

PAGE-LAYOUT SECTION

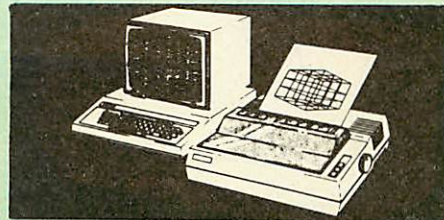
Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squashed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Pain may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint. This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds power to Beeb.

Wapping Editor Launch Offer: **£69**
Wapping Editor with
Quest Mouse **£89**

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

Continued



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12 **£40**
Aries B-12C **£5**



**CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383**

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

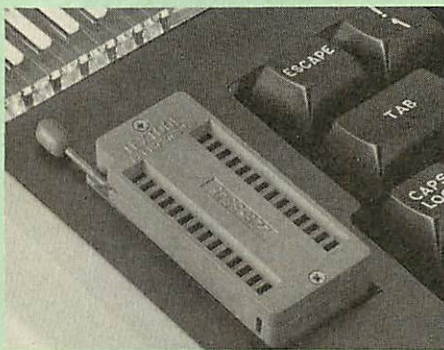
£238 (Carr £3)

EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only **£78**

SIDeways ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY £18 (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System **£11**
● Spare Cartridges **£2.50**
● Spare Rack **£1.50**

ROM Cartridges for the BBC Master
Twin **£8**; Quad **£12**

16K DISC RAM (16K Sideways RAM Module)

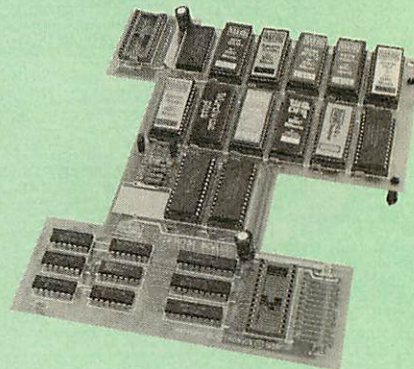
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector. Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDeways ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

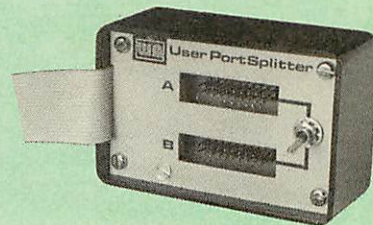
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- No soldering required.
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish" allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only **£35**
Battery backup fitted **£39**
Battery Backup only **£3**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: **£8**

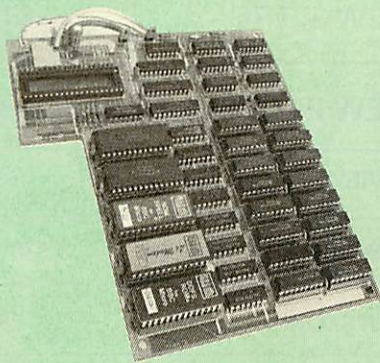
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM£48
- ROM/RAM card with 64k dynamic RAM£65
- ROM/RAM card with a massive 128k dynamic RAM£109
- (carriage on ROM-RAM Card £3)

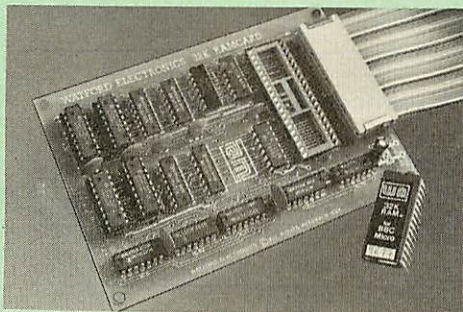
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit£17
- 16k Dynamic RAM for Upgrade£17.50
- Battery backup£3
- Read and Write protect switches£2 each
- Complete ROM-RAM board
- All options installed£115

P.S.

Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

32K SHADOW RAM- Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer - type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free - 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs£11.25
- Maths with a Story 2 (Disc) 4 further maths programs£11.25
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs£17
- WAVES: Science Topics (Disc) CSC O Level Physics program.£14.95
- RELATIONSHIP: Science (Disc) O Level Biology program.£20.00
- BONDING: Science (Disc) O Level Chemistry program.£20.00
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.£20.00
- ELECTRONICS IN ACTION (Disc) O Level program.£19.95
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program.£20
- ECOLOGY (Disc) O Level program.£20
- POLYMERS (Disc) O Level program.£20
- Classification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.£20
- FOOD & POPULATION (Disc) O Level program.£20
- MICROTECHNOLOGY (Cassette) O Level program.£11.25
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid.£21.70
- DEUTSCH DIREKT! (Disc & Audio Cassette)£19.95
- Modem Master (Disc)£11.25
- ADVANCED TELETXT SYSTEM£8.65
- PERIOD TABLE SOFTWARE£20
- Astronomy - Primary (Disc)£12
- Computers at Work - Primary£17.35
- Introducing Geography - Primary£17
- Introducing Geography 11-17yrs£17.50
- Electric Fields 6-14 years£11.25
- BlackQueen Contract Bridge£13
- Espana Viva - 3 Discs£19.95
- A Vous La France Disc£21.50

Acorn's Speech Synthesiser package, complete

Special Offer £15
BBC B Micro only

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£30
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
Printmaster	£24

Wordwise

£26

Wordwise plus

£40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER-CHART

ONLY: £25

Inter-WORD

£36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM

£76

INTERBASE £49

All Prices Exclusive of VAT

MINI OFFICE II

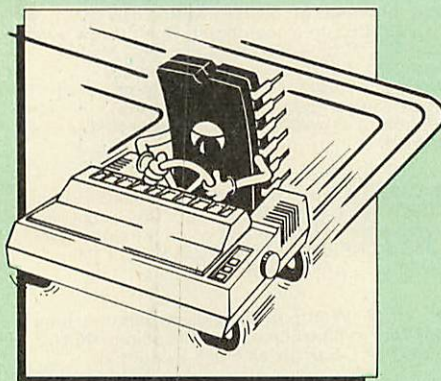
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
Disc Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

Advanced Computer Products

Advanced Disc Toolkit	£30
Advanced Disc Investigator	£25
Advanced 1770 DFS BBC	£29
Advanced 1770 DFS Master	£30
Advanced File Manager	£25.00
Advanced Control Panel	£30.00

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, Hi80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

VIEW

VIEW WORDPROCESSOR 2.1 £35

VIEW 3.0 ROM £48

VIEW PROFESSIONAL £59

HI-VIEW (for 6502 2nd Processor) £36

VIEWSHEET (Acornsoft) £36

VIEWSTORE £36

VIEWSPELL with 80 track disc £29

VIEWPLOT Disc £20
(Please specify for Master 128 or Compact)

VIEW-INDEX £12

OVERVIEW Packs 1 & 2 £69

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL – Uses and abuses of computers.

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GETTING ORGANISED – so that you keep track of your programs and control of your software. Setting up for easier programming sessions.

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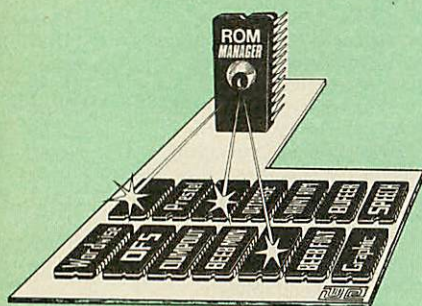
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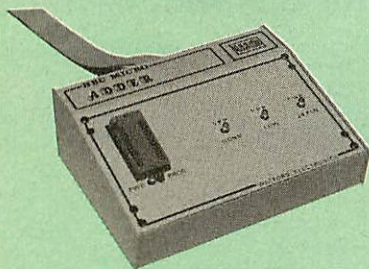


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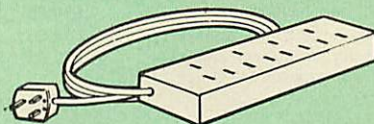
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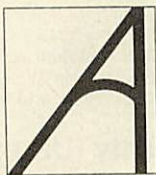
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STARS IN MOTION

Crash galaxies together on the screen of your micro to learn the mysteries of the heavens

Andrew Rankin

Have you ever gazed at the stars at night and wondered at the forces that shape the universe? Now you can experiment with the stars on your computer.

Although the stars appear to be scattered at random across the sky, in fact they tend to occur in clusters which themselves are members of larger and larger formations, until they reach the scale of galaxies of billions of stars.

The sun is situated on the outer edge of our galaxy. On a clear night, if you look overhead you will see a myriad of stars stretched across the sky in a wavy band, like a stream of milk. Hence the name 'Milky Way'.

Astronomers have been studying the heavens since ancient times and now know that the apparently stationary stars are actually drifting in space.

The stars are rotating about the centre of the galaxy like a gigantic spinning top, and the galaxy itself is moving relative to other nearby galaxies.

It is difficult to determine exactly how the stars move within galaxies as we are basing our knowledge on a span of a hundred years or so of photographic evidence, or at most several hundred years of observations. This is very short on the astronomical time-scale – one revolution of the Sun around our own galaxy will take about 250 million years!

Colliding galaxies

The many forms which galaxies take can be divided into three main classes: 'Elliptical' which have no evident internal structure, those with a central core surrounded by a thin disc with trailing spiral arms, which are 'Spiral' and the



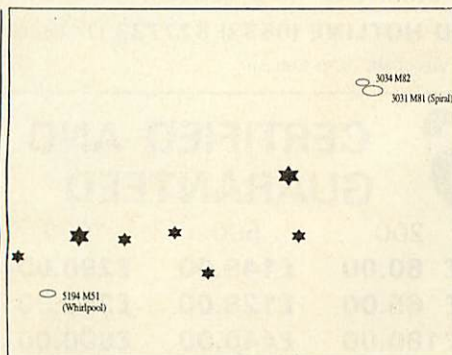
most common (75 per cent), and those which do not fit into either group and are classified as 'Irregular'.

There has been much conjecture about how these forms have arisen and whether galaxies can change from one form to another, possibly as a result of passing close to or colliding with another galaxy.

There are many examples of galaxies which appear to be interacting in this way, exerting gravitational influence on each other's stars. The Whirlpool Galaxy (NGC 5194 and NGC 5195) and the similar pair, NGC 7752 and NGC 7753, are spiral with an arm connecting the two galaxies. The Toadstool Galaxy has a bridge structure connecting the two nuclei made from material drawn out from either galaxy and in which new stars are forming.

The Cartwheel Galaxy is an example of a ring formation probably caused by a head on collision, and then there is the strange Antennae Galaxy (NGC 4038 and NGC 4039) which has two filaments arching outwards from the main stellar discs giving the appearance of an insect's head. They could have arisen by the galaxies approaching each other at approximately the right velocity and separation to orbit each other, throwing off two streams of stars.

If you have a pair of reasonable binoculars (at least 7x magnification and 50mm objective lens) you can observe the Whirlpool Galaxy as two bright cores surrounding a luminous halo close to Eta Ursa Major (the first star in the handle of the Plough). While you have the binoculars out, in the same part of the sky you can also see a spiral galaxy, M51 at the opposite end of this constellation.



Galaxies visible with binoculars

The problem

The interaction of two galaxies is an extremely complex subject. The galaxies are constantly evolving throughout the interaction, the theory of which is still not complete.

A galaxy may contain 100,000,000,000 stars at various stages of development and will probably have a complicated magnetic field as well.

To complicate matters further, galaxies are sometimes thought to centre on a massive black hole. Additionally, (contrary to popular belief) space itself is not empty but actually contains a significant amount of material thinly spread out and possibly moving.

We can apply the laws of physics to this situation to formulate theories of galactic structural change and we can use computer processing to speed up the many calculations involved but how is it possible to track the motion of billions of stars in such a convoluted problem?

The answer is of course, simple. Just use a computer simulation in which only the essential features of the colliding galaxies are represented.

This solution allows theories under development to be tested, which would otherwise be impossible. Early simulations used mainframe computers but nowadays modern microcomputers have advanced sufficiently to allow us to build a model of sufficient detail, albeit on a reduced scale, on a Master.

The computer model

In this simulation, the first simplification is to exclude all forces other than gravity – as indeed do most other computer models of this problem. Secondly, it is believed that less than 10 per cent of a galaxy's total mass is in the disc with the bulk of its mass contained in the nucleus (or distributed throughout the galaxy as dark matter) so we can ignore the gravitational forces due to the disc stars.

HOW IT WORKS

The force of gravity is described by:

$$\text{force} = \frac{\text{constant} \times \text{mass A} \times \text{mass B}}{(\text{distance between A and B})^2}$$

In this program a small value is always added to the separation to prevent the denominator becoming zero. So the gravitational constant is equal to one, time is in units of 1.2 million years, distance in 500 parsecs (1600 light years) and mass in units of 20,000 million solar masses.

The solution of the equation of motion of each star is achieved by breaking down the movement into a series of time steps.

At the beginning of each step, the position of each star is known and the force due to the two galactic centres can be obtained using the equation which is shown above.

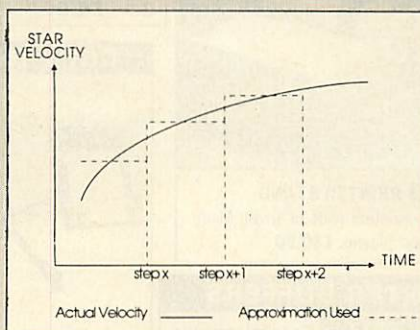
As the star moves, this force will vary as the distance to the galactic nuclei changes. To simplification, the force is fixed at its initial value throughout the time step. Using Newton's Second Law:

force = mass * acceleration
the acceleration (also fixed) can be derived. To determine the new position of the star, the velocity is fixed at the value occurring half way through the current time interval. The velocity is calculated from:

$$\text{new velocity} = \text{old velocity} + \text{acceleration} \times \text{time step}$$

The new position is then derived from the fixed velocity by:

$$\text{new position} = \text{old position} + \text{new velocity} \times \text{time step}$$



Simplifying velocity calculations

Finally, the centres of the two galaxies are moved using the same method and the whole cycle is repeated. This results in a simple algorithm which can be processed rapidly.

These peripheral stars move under the influence of the two central cores only and trace out the gravitational field of the combined system. Paradoxically, more sophisticated models, which include the gravitational forces due to individual stars, produce less convincing results.

It is not practical to represent billions of stars on a micro. So in our model we have decided to use hundreds of points which each effectively take the place of a billion stars.

This procedure makes running the simulation within the confines of memory and reasonable processing time possible, yet it also manages to present reasonable detail of the interaction.

The model consists of a target galaxy made up of a disc of stars in circular orbit round a central core and a passing intruder galaxy represented only by its nucleus. The target is 15,000 parsecs wide and contains 100 billion star masses which is in the range observed for this type of galaxy (SO Spiral – which is disc shaped with no spiral arms).

The problem reduces to calculating the positions of the two galactic centres and the target galaxy stars in their combined gravitational field.

Running the simulation

The simulation begins with the setup screen and you are prompted to input the initial parameters for the two colliding galaxies. You will note that the number of stars are distributed around the target galaxy in rings.

While experimenting it is advisable to use relatively few stars (say, four rings of 10 stars) to see the effects of your parameters so the processing will be as fast as possible. When you are satisfied you have an interesting situation, use several hundred stars for a detailed view.

The intruder galaxy's mass is entered as a percentage of the target galaxy mass so typing 100 will provide two equally massive nuclei. The position and velocity are specified in Cartesian co-ordinates (X,Y,Z) relative to the target galaxy at the origin (0,0,0).

The separation must be in the range 70 to -70 distance units in the X and Y directions and 35 to -35 in the Z direction to fit on the screen. The Z distance limits are smaller because this axis is magnified to give a clearer picture of events. Try entering X=7.5, Y=0, Z=35 for the distances.

The velocity components chosen



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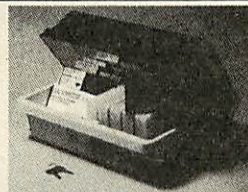
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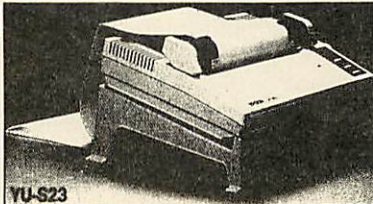
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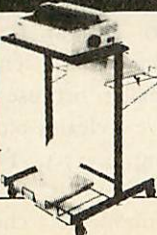
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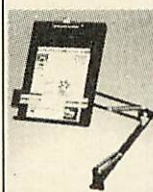
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should be less than two units to start with, as you will find this allows time to establish a pattern. Specifying a positive value means the intruder will travel away from the target on this axis, so you should start with something like $X=0$, $Y=0$, $Z=-1$ for the respective velocity components.

You are then presented with an option to run the simulation, alter the parameters or exit the program.

Collisions in progress

Once the simulation is actually under way you will be presented with a new screen showing the parameters you have entered and their current values will be automatically updated during the run. The lower half of the screen shows a pair of two dimensional views of the x-y and x-z planes with the z axis enlarged by a factor of two.

Incidentally, note that the display is upside down compared to the normal Beeb layout. That is, the x-axis is left to right but the y-axis (and z-axis) origin is at the top and increases towards the bottom of your screen.

The target galaxy appears as a central ring surrounded by the specified number of rings of stars and the intruder appears as a solid circle.

The computer will calculate the motions of the tracer stars and the galactic centres and it will then re-display them along with the new parameters and the time step in time units.

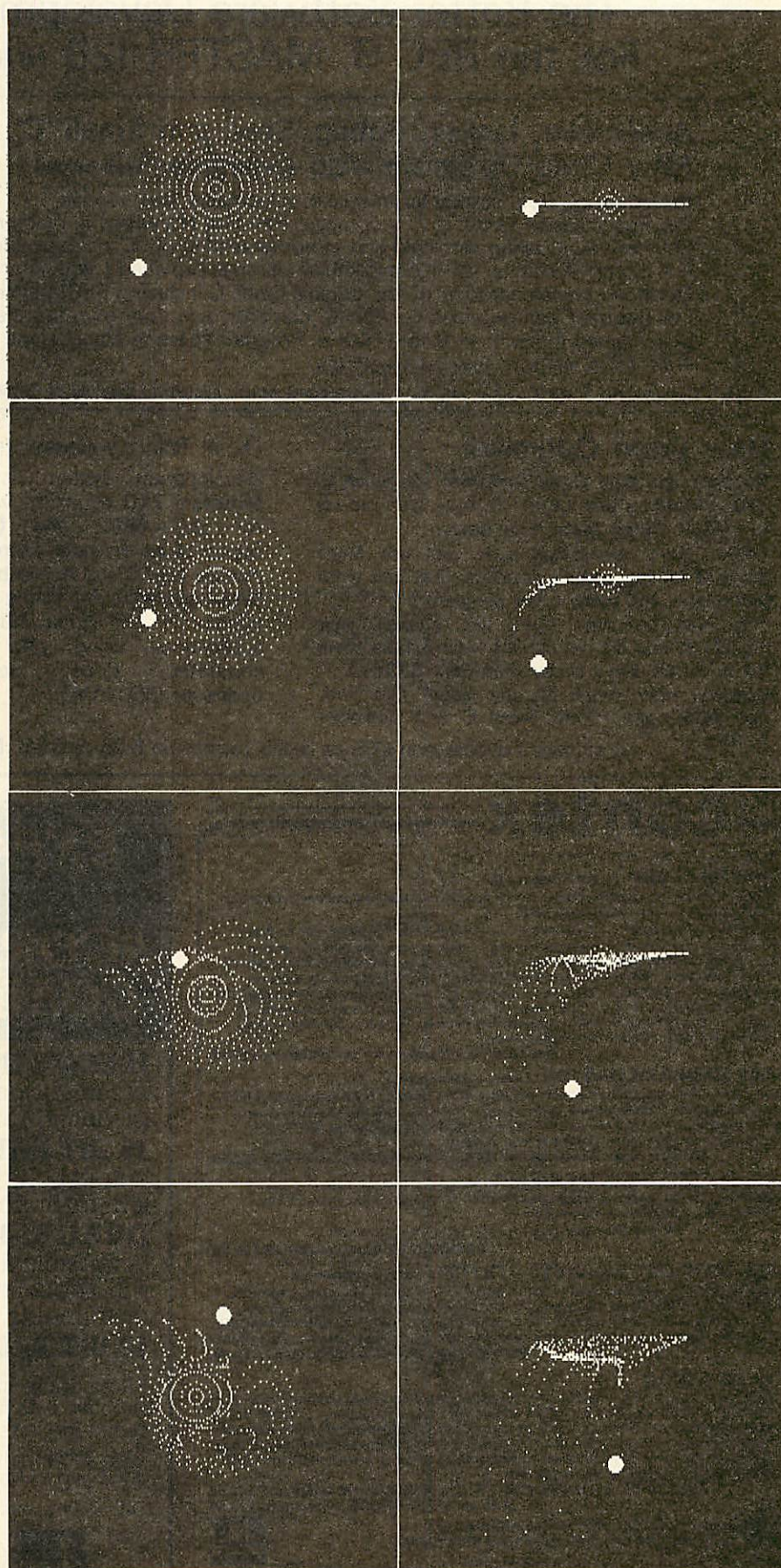
If you use the first suggested values, after 50 or so cycles you should have a ring shaped galaxy on your screen. Regardless of the positions of the galaxies the program will attempt to centre the display on the mid point between the two nuclei.

As you watch the nuclei interact and the stars change position you can at any time press P to cause the simulation to pause at the end of the current cycle of calculations and display '...waiting...'.

Pressing G will initiate the graphics dump command installed in PROCdump. If the S or E keys are pressed while the screen is being printed the selection will be enacted there and then, otherwise the option will run immediately after the next cycle of movement.

Pressing S will abort the sequence and return to the set up page ready for another trial and E will exit the program.

The fifth choice is I which enables the user to select the number of time step



A sequence from the program showing a possible mechanism for the formation of spiral galaxies by a close call with a passing galaxy

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less of any previous stopping point unless of course you select this option after setting up.

This iterations facility allows you to set up a complex of many time steps, go off and make a cup of coffee and the model will be waiting at the selected point on your return.

The simulation is entirely in Basic 4 so it will run only on the Master, Archimedes or BBC model B with second processor. The unexpanded model B is unsuitable because we are using mode 0 graphics for this project and require reasonably sized arrays to accommodate the stars' parameters.

The program could be converted fairly easily to run under Basic 2 on a model B with shadow Ram by using GOSUB's at line 140 and using the explicit form of VDU command at line 470.

Starting up

It is useful to have some starting parameters to get going with, to make sure you have typed in the program correctly from the yellow pages.

The table shown above gives a selection of values, which you should find useful to be going on with, and also the results you should find appearing on your screen. Obviously, once you have the program working correctly, the most interesting part will, of course, be inserting your own values.

A proper 'Antennae' galaxy interaction cannot be reproduced completely by this program as it requires a set of disc stars around both the target and intruder nuclei. These shear off to form two filaments when the galaxies approach and orbit each other.

Using the starting values in the table and 15 rings of 50 stars, you can obtain a single filament arc of five stars breaking away after about 60 time units – a sort of 'half antenna'. See for yourself if you can improve on this!

FURTHER READING

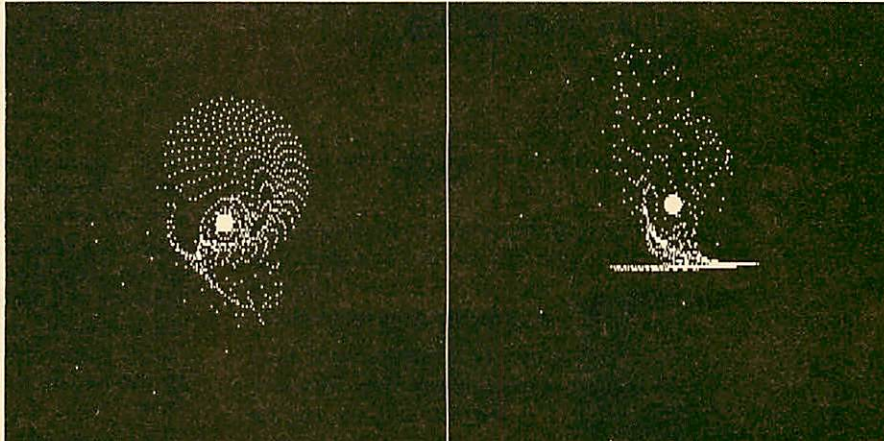
Amateur Astronomy edited by Colin Ronan, published by Newnes. A good starting point.
Star Gazing Through Binoculars by Mensing. A practical guide for observation.
Colour Atlas of the Galaxies edited by Wray, published by Cambridge. This includes a superb set of colour photographs of the galaxies. This program is based on an article by M C Schroeder and N F Cumins appearing in the December 1988 issue of *Astronomy magazine*.

STARTING PARAMETERS

Mass fraction (%)	Position			Velocity			Result
	X	Y	Z	X	Y	Z	
100	7.5	0	35	0	0	-1	Ring
25	40	10	10	-1	0	0	Bridge
25	-30	30	0	0	-0.34	0.34	Whirlpool
100	0	30	10	0	0	-0.35	Half Antennae

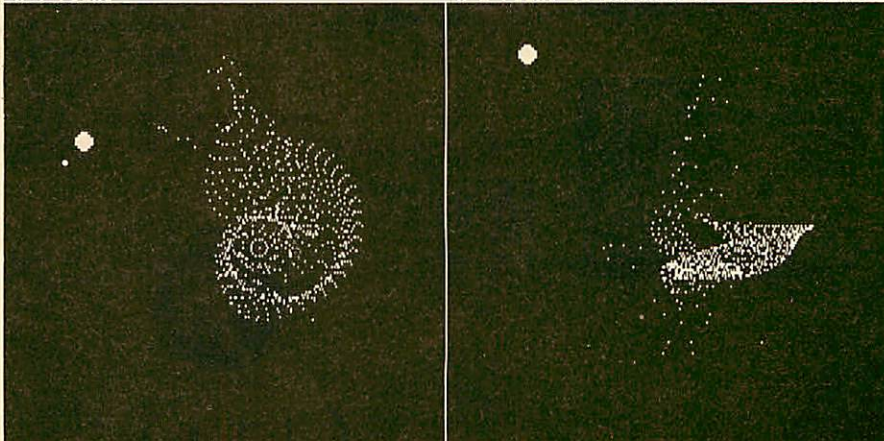
```

COLLIDING GALAXIES SIMULATION version 1.02
-----Target galaxy-----Intruder galaxy-----
- start: - now: - start: - now:
Mass      5      5      5      5
X coordinate 150  150  150  150
Y coordinate 100  116.13 130  113.87
Z coordinate 0    -2.7511 10  -9.9989
Velocity (X) 0     0      0     0
Velocity (Y) 0     0.61253 0    -0.61253
Velocity (Z) 0    -0.5348 0    -0.35
              0.1848
(P)ause (I)terations (G)raphics dump (S)et up (E)xit
X-Y plane X-Z plane (Z shown x 2) Time 65
  
```



```

COLLIDING GALAXIES SIMULATION version 1.02
-----Target galaxy-----Intruder galaxy-----
- start: - now: - start: - now:
Mass      5      5      1.25  1.25
X coordinate 150  146.44 190  87.239
Y coordinate 100  109.23 110  73.082
Z coordinate 0    9.2296 10  -26.918
Velocity (X) 0    -8.516E-2 -1  -0.65936
Velocity (Y) 0    0.1039 0    -0.41561
Velocity (Z) 0    0.1039 0    -0.41561
              0
(P)ause (I)terations (G)raphics dump (S)et up (E)xit
X-Y plane X-Z plane (Z shown x 2) Time 117
  
```



Complex galactic shapes are formed
by close collisions after a large number
of time periods

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CHECK IT OUT

For all those mistakes that keep cropping up in your letters and documents, Textchecker can offer the answer

Chris Robbins

The trouble with wordprocessors is that they allow you to make errors even faster, not to mention more frequently! It's not that they aren't useful, powerful and extremely versatile in their applications but trivial mistakes are so easy to make, and just as easily overlooked.

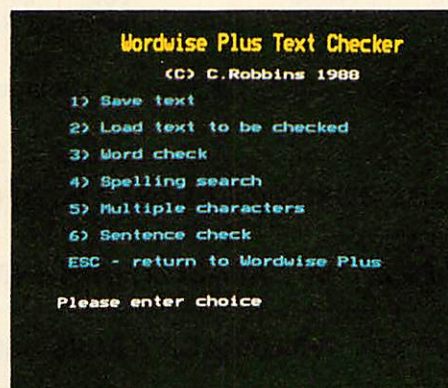
Take duplicated words for example. Finding them can be quite a strain – a bit like looking for a needle in a haystack. If you've spotted the deliberate mistake, well done, but it's not always that easy, especially when checking any quantity of text. For those who still haven't detected the error, 'example' has been typed twice in the very first sentence of this paragraph!

Textchecker has been designed to locate this and other errors. Written in the *Wordwise Plus* text processing language, and so requiring the *Wordwise Plus* Rom, it can nevertheless be used with text files imported into *Wordwise Plus* from other wordprocessors such as *View* or *Interword*.

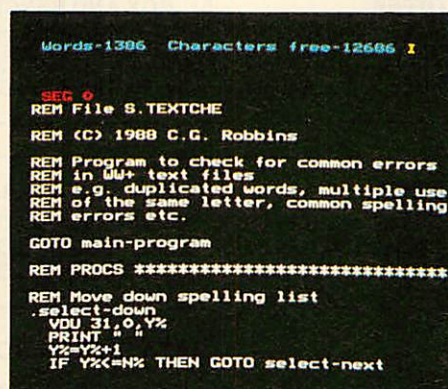
The text to be checked is held in the main text area, while the *Textchecker* program runs in segment 0, with another segment being used to hold program data. To simplify loading and startup of the program, a short Exec file is given, which sets up segment nine as the data area. Another area can be used simply by changing the value assigned to L%. The program can be restarted at any time simply by pressing Shift-fo.

Once running, a menu is displayed giving options to load and save text, and to perform various checking functions. These need a little explanation.

Option three (word check) scans the main text area looking for instances of one of the commonest errors, duplication. Having selected this option, the user can choose either to continue checking from the current position in text or to start from the beginning.



Load, save and check options are displayed



Textchecker helps achieve error-free text

For the sake of speed, the text isn't displayed while it's being checked, only if *Textchecker* locates a possible error. Its position is indicated by the flashing cursor and a message indicating *Textchecker*'s findings is displayed at the bottom of the screen.

The error may be corrected there and then, after replying N to the prompt to continue. Having fixed the problem, the checking process can be restarted by pressing SHIFT-fo. This brings up *Textchecker*'s menu, from which option three can be selected, and the search continues from the current position in text. This method of operation applies to all the text checking options.

Option four (spelling search) isn't a spelling checker in the accepted sense.

Rather, it's a way of picking up lapses in spelling. Put another way, it allows you to get consistent spelling (whether it's right or wrong!).

An obvious example is the case of 'i' before 'e' except after 'c'. One I always have a problem with is whether to use 'ise' or 'ize' in words such as 'organise'. I recognise both forms and tend to mix them up!

The spelling search option provides a means of automatically locating such problems. *Textchecker* allows you to select spellings from a list held in the data segment, or alternatively enter an example of your own. Using the list is simplicity itself, the cursor keys are used to move a pointer up or down to select the required problem spelling.

From then on program operation is exactly the same as the check for duplicated words. You can of course modify the supplied list of problem spellings to suit your own requirements or devise your own and load these into the data segment.

Option five (multiple characters) tests for the presence of possible invalid repetition of letters. A combination such as 'lll' for example, is the sort of mistake that's easily made by keeping a finger on a key for just a touch too long.

Option six (sentence check) checks that sentences have been correctly terminated or, put another way, that they start correctly.

Textchecker is far from being all powerful, and it won't produce polished prose. However, if you use all of the options, it can certainly show you where to take a file to get rid of most of the rough edges.

Incidentally, it is also possible to improve *Textchecker*'s performance even further by applying the rules I gave on program compression in the March 1989 issue of *BBC Acorn User*.

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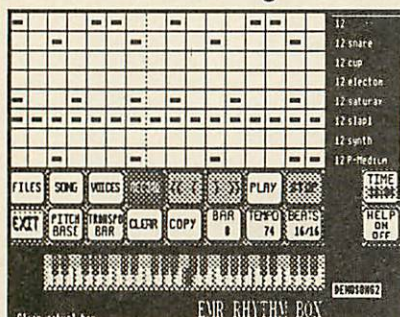
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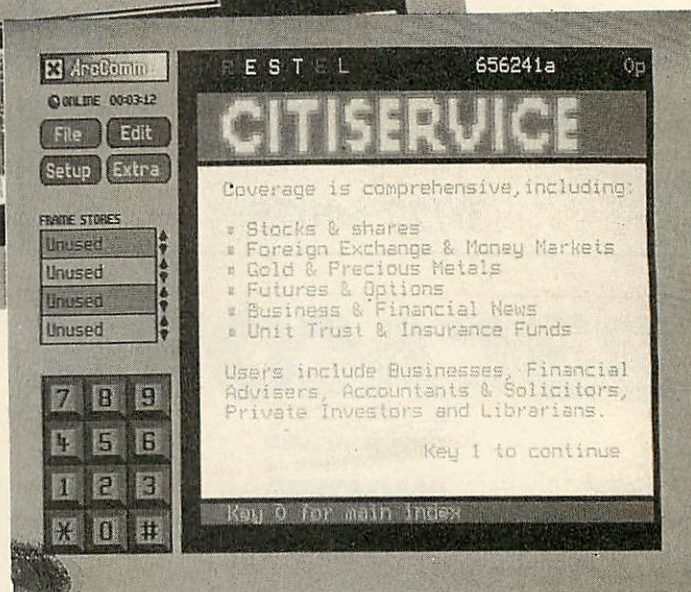
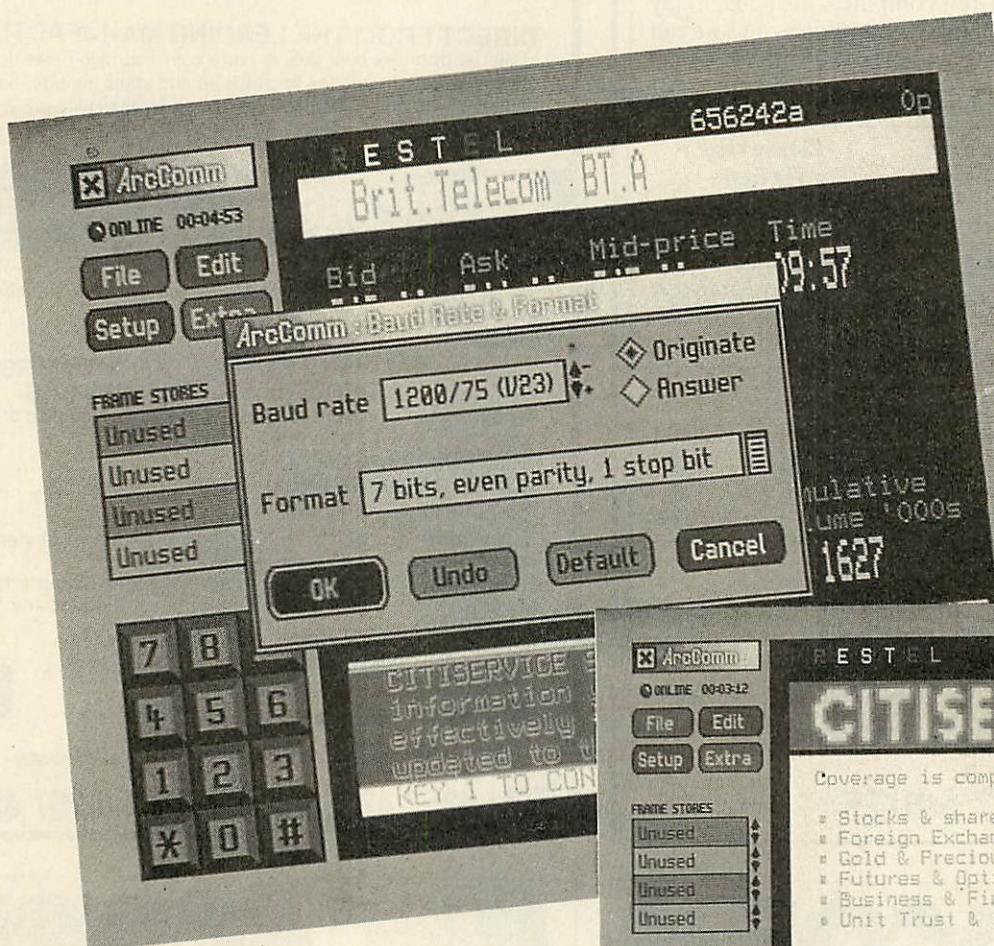
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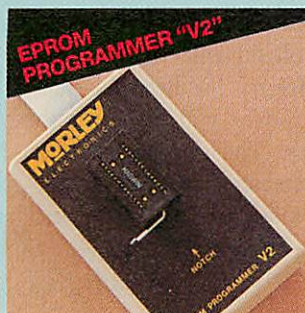


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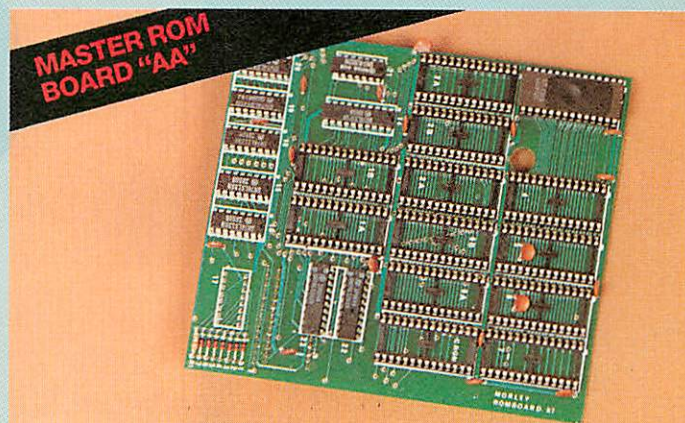
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ORGANISERS

GET THE FAX

**Yes, you can save money and still be a yuppie.
Fax-Form will fill your filofax easily – and at a low cost**

Michael Geller

The personal organiser has become popular over the last few years but for many (including me!) the cost of pages is prohibitive. With this in mind, I wrote the *Fax-Form* program to edit and print out pages for personal organisers.

The program can put horizontal and vertical lines in both solid and dotted styles, as well as text, onto a page, and allows printout to an Epson compatible printer. It also allows pages to be saved to disc and loaded back in later.

The program runs in mode o, to allow an accurate representation of the printout on screen. I have tried to make the program easy to use so it is menu-driven and contains on-screen prompts and instructions.

The program is rather long and greedy on memory, so it will only run on machines equipped with shadow Ram – such as the Master 128 and Compact, B+ and B+128 and expanded model Bs and Electrons. It also runs on the Archimedes.

When the program is run, the screen will clear to a dotted pattern, and a window will appear in the middle of the screen. The window contains a three-option menu (known as the Format menu), which prompts for the format of the finished page (horizontal or vertical) or for abortion of the program. Having selected one of the first two options, the format menu will disappear, and two windows will appear. One contains the main menu, which has nine options. This window will also be used in the course of the program to prompt the user about the input, and to give instructions. The other window, which is larger, is the

page window, and this is where the actual page design will take place. The position of the window will depend on which format has been selected. If it is vertical, then the window will appear on the far left-hand side of the screen. If horizontal format has been selected, then the page window will be across the top of the screen. The vertical window is 36 by 36 characters in size, while the horizontal window is 72 by 16 characters. Both these have been chosen to fit comfortably on a standard page of personal organiser paper.

The program allows orthogonal (horizontal and vertical) lines to be drawn in either solid or dotted styles, which is all that is required for most typical organiser pages (forms, timetables, diaries etc), and the first four options on the main menu deal with these. After pressing '1', the menu window will contain an instruction to position the first point. A crosshair cursor will be seen in the page window.

This cursor can be moved to anywhere in the page window. When the first point of the required line is reached, 'fix' this point by pressing TAB. This is used throughout the program as a 'fix' key. Having chosen the first point, use the left and right arrow keys to select the other point. Pressing TAB again will draw the required horizontal line, and return you to the main menu. Note that after the first point has been selected, the up and down cursor keys are disabled as moving the second point vertically would not result in a horizontal line.

From the main menu, selecting option 2 (dotted horizontal lines) will allow a

ORGANISERS

dotted horizontal line to be drawn in the same way. Note that the crosshair cursor is now dotted. Options three and four (vertical and dotted vertical lines) are used in the same way to draw solid and dotted vertical lines.

The cursor keys are used to move to the first point, and TAB selects it. Then the up and down cursor keys choose the second point which is again selected by TAB. On all cursor movements, the cursor has full wraparound on all four sides of the page window.

Option five (text) allows text to be included on the page. On pressing '5', a flashing underline cursor appears in the page window, which can be moved within the window using the cursor keys. If the cursor is driven off the edge of the page window, it will wraparound to the

Mon	MUSIC	-	MATHS	ENGLISH	FRENCH	GERMAN	PHYSICS	-
Tue	FRENCH	ENGLISH	PHYSICS	BIOLOGY	-	G	A	M
Wed	MUSIC	MATHS	-	ENGLISH	-	CHEM'RY	-	GERMAN
Thu	GERMAN	-	CHEM'RY	FRENCH	-	G	A	M
Fri	PHYSICS	MATHS	ENGLISH	BIOLOGY	-	MUSIC	GYM	CHEM'RY

1. Horizontal lines
2. Dotted horiz. lines
3. Vertical lines
4. Dotted vert. lines
5. Text
6. Load page
7. Print page
8. Save page
9. Quit

Designing a timetable using Fax-Form

opposite side. Text can be typed in as normal on the keyboard. The DELETE key will move the cursor one character back and erase the character there, and RETURN will move the cursor to the start of the following line. The editing of text is very similar to using a wordprocessor in overwrite mode. In addition, function keys fo to f7 can be used to insert the graphic characters which make up the four line styles at the cursor, and are useful if you have inadvertently erased a line with text. Pressing TAB will return you to the main menu.

Selecting option six (load page) will allow you to load a previously saved page for subsequent editing or printing. The program prompts for a filename which will be entered in the menu window. If you subsequently decide not to load a page, or you select option six by accident, then pressing RETURN while entering a filename will abort the load operation and return you to the main menu. If you do enter a filename, and press RETURN, the computer checks that a page with this filename exists on disc before loading into the computer's mem-

ory and displaying. The page window will be in the correct format (horizontal or vertical) for the new page.

The print option (option seven) allows the page to be printed to an Epson compatible printer. Before selecting it, turn on and set up the printer. The most convenient way to produce printed output is to use the pre-punched fanfold stationery available for personal organisers. This has the six holes pre-punched in the paper, and has sprocket holes for use with a tractor feed, and so can be positioned accurately. Alternatively, blank cut sheets of personal organiser paper can be bought and used on a printer with friction feed. With this method, take care to align the paper accurately, as there is little room around the edge of the paper. Either way, when the printer is ready, pressing 'seven' will cause the page to be printed, and the main menu will be displayed when printing is complete.

To save a page, select option eight. Like the load option (option six), the save operation can be aborted by pressing RETURN without a filename. Otherwise, the current page will be saved under the filename entered. When a page is saved, its format is included so that it can be reloaded in the correct format.

Finally, option nine (quit) allows you to leave the current page, and returns you to the format menu. You can then start work on a clean page, or leave the program entirely and return to Basic.

The data for the edited page is stored in five 128-byte pages (starting at the variable page%) plus one byte. This final byte holds the Ascii codes for 'H' or 'V' corresponding to a horizontal or vertical format page. The procedure PROCgetformat prints the title and the format menu, and after obtaining the format calls appropriate procedures. The format is also held in Boolean form in the flags horiz% and vert%, with a third flag quit% to determine whether the program should be aborted or not. The procedures PROCpage and PROCvpage will set up and draw the page window (complete with holes!), and PROChorizvars and PROCvertvars set the flags, and the variables height% and width%, which are the dimensions of the page window. On Master 128s and micros with Acorn's GXR Rom, a dotted background is achieved using an Extended Colour Fill Pattern, defined at line 50 and used in line 4450. Delete these lines if you do not



COLOURJET 132

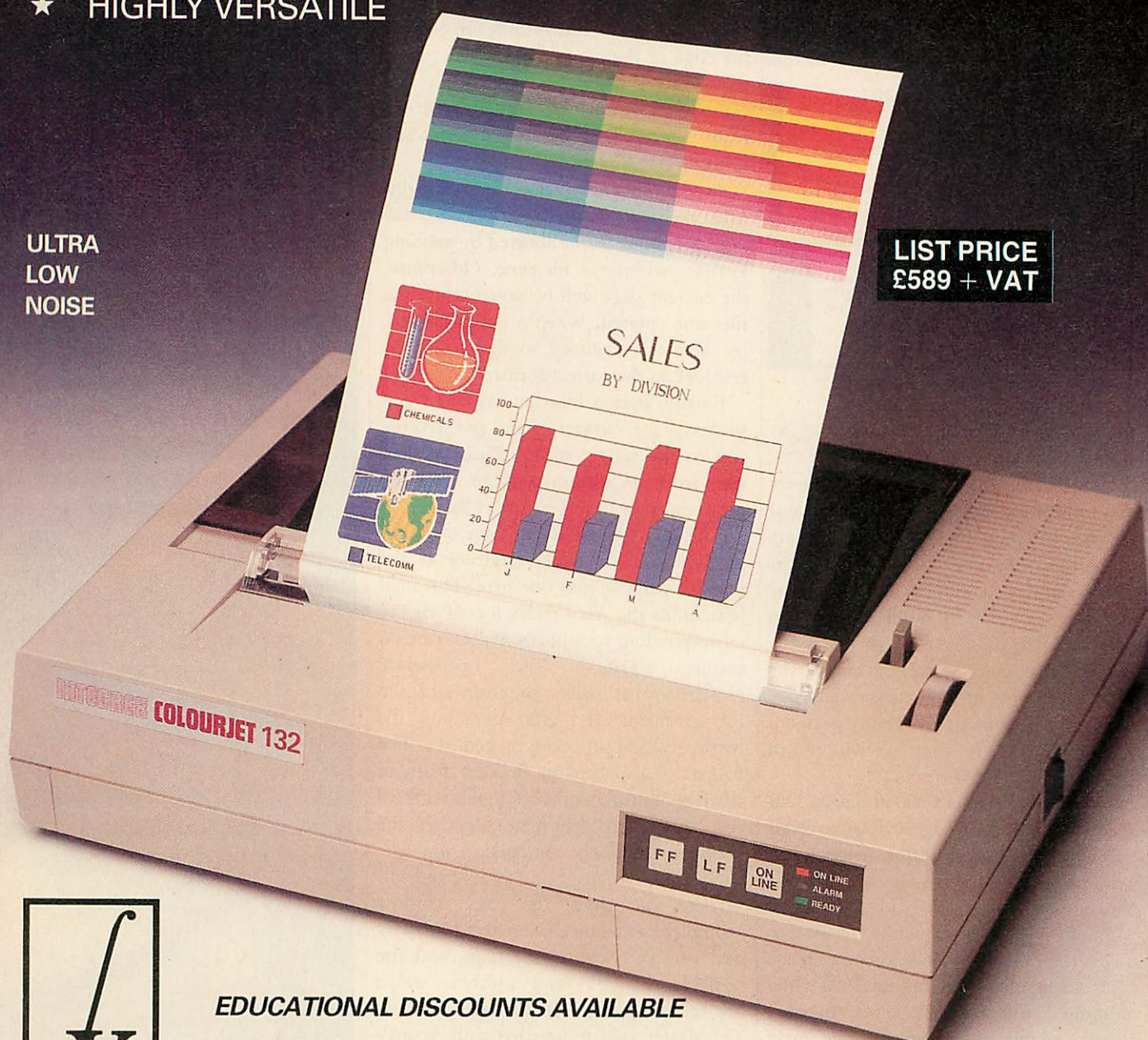
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The main loop of the program runs from line 330 to 420. In this loop, the main menu is displayed, and an option number (choice%) returned. This is done in the function FNmenu. The outline text used in the title is printed by the procedure PROCoutline, which prints the text (using VDU 5) in the foreground colour displaced by one pixel from its actual position. Then it is printed in its correct position in the background colour. After FNmenu has returned the option, it is subsequently acted upon.

Option one and two call PROChorizline, which takes as its argument an Ascii code of the user-defined character required to make up the line. The characters are defined in line 100-180. The two loops that return the co-ordinates of the endpoints of the line run from lines 3090-3220 and lines 3290-3380. Line 3400 needs some explanation. Since the endpoints of the line could have been chosen left followed by right, or right followed by left, the SGN function is used, returning the 'direction' of the line. However, the two points might have the same co-ordinates, and in this case the SGN function would return zero. To avoid this, the expression (xpos%=oxpos%) is included at the end of the line. This will yield a step of one if both points have the same position. The character is stored in memory by the procedure PROCstore, and FNretrieve does the opposite, returning the character at a particular position.

When drawing the line, it is necessary to check if the line crosses another line. In this case, a 'cross' character is required. The array 1kp (AB) (initialised in PROCdotable) contains the Ascii code of the character required when character A is superimposed on character B. The procedure for drawing vertical lines (PROCvertline) is very similar to PROChorizline.

The procedures PROCwindow and PROCmwindow select the page window and the menu window respectively. They are used extensively in the program to switch windows. For example, the text editing procedure PROctext calls PROCwindow to print the title and instructions (lines 2060-2080) before selecting the page window for editing. If an alphanumeric character is typed, PROCalphachar prints, and stores it. PROCgraphchar does the same for the characters on the function keys. The

Date:	
09.00am.....	
10.00.....	
11.00.....	
12.00.....	
1.00pm.....	
2.00.....	
3.00.....	
4.00.....	
5.00.....	
6.00.....	
Contact:	
Notes:	

Fax-Form lets you design pages both horizontally or vertically

mode 0	graphics	640x256
mode 1	graphics	320x256
mode 2	graphics	160x256
mode 3	text	80x25
mode 4	graphics	320x256
mode 5	graphics	160x256
mode 6	text	40x25
mode 7	teletext	40x25

PROGRAM NOTES

BBC ACORN USER ----- BBC ACORN USER

Text and lines are all it takes

delete key sets the delete% flag to delete the character at the left of the cursor, and the procedure is ended when Tab is pressed (Ascii 9)

PROCload will load a page into memory. It checks if the file exists by OPENING the file. If the function returns zero, the file does not exist. The OSCLI command is used to load the file, so Basic 1 users will have to replace line 2900 with:

```
2900 PROCOScli ("LOAD "+file$+"
"+STR$(page%-1))
and add a procedure like the following:
4680 DEF PROCOScli ($&700)
4690 LOCAL X%,Y%
4700 X%=0
4710 Y%=7
4720 CALL &FFF7
4720 ENDPROC
```

Similarly, the save option uses OSCLI to save the page to disc, so line 2770 must be replaced with:

MENU	
1.	Horizontal lines
2.	Dotted horiz. lines
3.	Vertical lines
4.	Dotted vert. lines
5.	Text
6.	Load page
7.	Print page
8.	Save page
9.	Quit

```
2770 PROCOScli ("SAVE "+file$+"
"+STR$(page%-1)+"
"+STR$(page%+&500)
```

After loading, PROCdisplay is called, to show the new page on-screen. It replaces each character at the end of a line with CHR\$, allowing use of the \$ (string) indirection operator for speed. The final character is put in afterwards.

The print routine, contained in the procedure PROCprint, is called by option seven. Printing is carried out in a mixture of graphics and text modes. Lines are printed in two passes of 16-dot graphics (using the ESC“” sequence) for high quality. Text is printed in Elite mode, because this text has exactly the same aspect ratio as text in mode 0. The data for graphic printing is set up in the procedure PROCpchars, and stored in the array pchar\$. PROCoutput sends this data to the printer one byte at a time. The function FNjoiner is used since when outputting to a printer, gaps are left between lines. FNjoiner returns the code for a vertical line if the characters on and below the current line have vertical components, and so allows unbroken vertical lines. It can return codes for either a space, a solid vertical line or dotted vertical line.

Finally, the quit option on the main menu causes the program to drop out of the main loop into the outer loop to redisplay the Format menu. Pressing 'Q' now returns to Basic.

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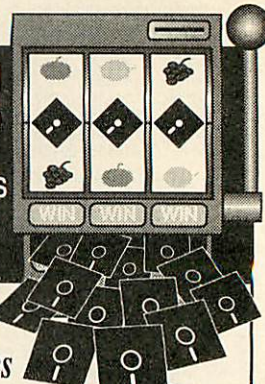
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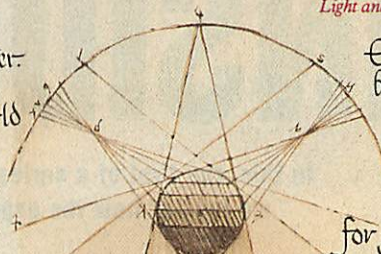
Mag x 4 illustrating pixelisation

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Light and shadow theory c.1492

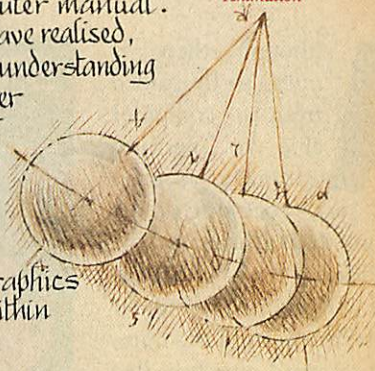


shadow and light (the effect of light moving three dimensional objects) reads like a computer manual.

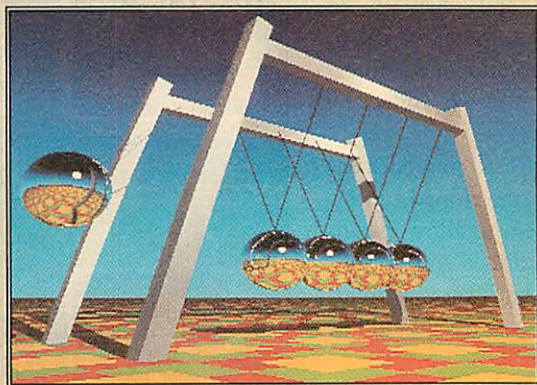
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INSIDE OUT

In this, the first of a series on interfacing your Arc,
we look at how the expansion system works

Alex van Someren

Although there is much to be gained from a computer able to perform arithmetic at great speed, such processing power is of no value if the machine is isolated from the real world. Of course, computer manufacturers build in a number of standard interfaces like keyboards and displays to make the computer useful to humans but tailor-made interfaces may also be added by the user.

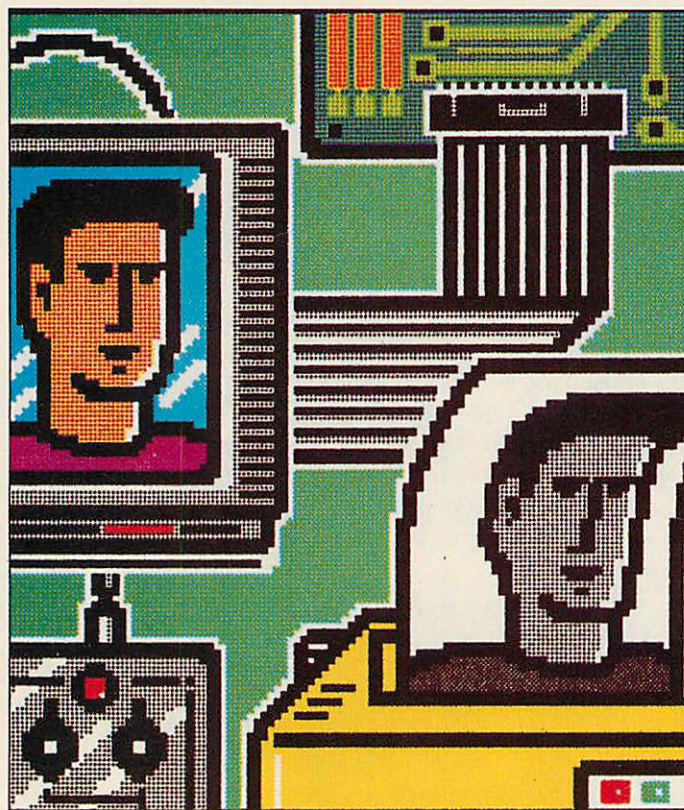
The Acorn Archimedes has a highly developed interfacing system to allow expansions to be added to the basic computer hardware, providing for just this kind of application.

A diversity of expansion cards is produced for the Archimedes both by Acorn and by third parties – everything from sound samplers to document scanners – and allows it to acquire and regurgitate information about the outside world.

While the design of such equipment requires a fairly sophisticated understanding of electronics, simpler projects can be constructed in just a few hours (or even minutes) by someone with minimal technical knowledge but an understanding of how the Archimedes expansion system works.

Indeed, the new National Curriculum demands that pupils have a high degree of knowledge and practical experience in such matters.

This article describes the fundamentals of interfacing electronic circuitry to the Archimedes for readers with a basic understanding of computers and electronics who wish to apply their skills to



practical construction projects. Subsequent articles will detail a number of simple projects to which these skills may be applied.

Podules

The Archimedes is designed to allow expansion cards to be fitted within the computer. (These were once known as 'podules' but this name now seems to be falling from favour). Before this is possible a 'backplane' must be fitted to provide expansion slots connected to the main circuit board.

400-series Arcs have a four-slot backplane (the largest possible) fitted already. For 300-series owners an Acorn or third party backplane must be fitted.

Any expansion card which were to be fitted to an Archimedes must follow a set of guide lines devised by Acorn to

minimise conflicts produced by several expansion cards from different manufacturers. These guidelines, however, are not readily available to the public so the first job is to establish what may and may not be done.

Every expansion card needs to provide at least the first two of the following four functions to operate correctly:

- **Signal buffering.** The memory address, data and control signals which the ARM microprocessor produces must be buffered (amplified, in effect) so as not to overload the circuitry on the main board.

- **Address decoding.** In order to establish which expansion card is being addressed and which function on it is selected, circuitry must be

present to decode the ARM's address signals. The first stage, deciding which expansion card is being accessed, is done by the backplane itself.

- **Expansion card software.** Each expansion card can carry Rom/EPROM memory devices containing some or all of the software needed to operate it. If it does, circuitry must be present which allows the memory device to be accessed by the operating system according to a tightly defined specification. Very simple expansion cards may not require such software, but it is usually a good idea to build some in for compatibility anyway.

- **Interrupt Handling.** Where an expansion card needs to transfer data irregularly but quickly into the computer's memory it is normal to 'interrupt' the ARM microprocessor to cause it to effect the transfer. If this mechanism is used,

circuitry must be present to allow the operating system to identify which expansion card has generated the interrupt.

Generally, guidelines concerning power supplies and consumption must be adhered to so as not to overload the Archimedes' power supply.

In particular, Acorn does not guarantee any power supply other than +5 Volts will be available on future computers so cards should really avoid using the +12V and -5V supplies. Furthermore, no expansion card should consume more than one Amp of current from the +5V supply: This is unlikely to be a limitation for most simple cards.

How the system works

The Archimedes range is built around Acorn's ARM microprocessor and three supporting chips. Of these, the Input/Output Controller (IOC) is responsible for communication with peripherals. IOC provides the serial keyboard interface, counter/timers, peripheral address decoding and timing control for peripherals and expansion cards.

IOC also drives a set of on-board buffer ICs which reduce the width of the 32-bit ARM data bus to a more manageable 16-bit for input/output. This makes sense since input/output devices rarely move data more than 16 bits at a time.

Under the control of IOC, peripheral devices may be accessed at a variety of speeds allowing older and slower ICs to be attached with minimal effort while *still permitting* high-speed operation for modern circuitry.

In fact, every expansion card can be addressed at one of four software selectable speeds: Slow, Medium, Fast and Synchronous. Different regions of the memory address space are used to control the speed of access, so each of the four possible expansion cards appear four times in the address map, according to the speed of access required.

The region of the address space reserved for the expansion cards and other IOC devices is between &3000000 and &3400000. This space is further subdivided into non-contiguous regions for each different access speed, with a 16K word (&4000 in hexadecimal) subdivision of each region for each expansion slot. Table 1 summarises this.

Data is fed to the expansion slots as a 16-bit half word. Transfers to or from expansion cards can be made either eight bits or 16 bits at a time. 8-bit transfer is

Address:	Slot – access speed:	
&33D0000+	Unused	
...		
&33CC000	Slot 3	Sync
&33C8000	Slot 2	Sync
&33C4000	Slot 1	Sync
&33C0000	Slot 0	Sync
...		
&334C000	Slot 3	Fast
&3348000	Slot 2	Fast
&3344000	Slot 1	Fast
&3340000	Slot 0	Fast
...		
&32CC000	Slot 3	Medium
&32C8000	Slot 2	Medium
&32C4000	Slot 1	Medium
&32C0000	Slot 0	Medium
...		
&324C000	Slot 3	Slow
&3248000	Slot 2	Slow
&3244000	Slot 1	Slow
&3240000	Slot 0	Slow
...		
&3000000	Start of expansion space	

Table 1. The expansion memory map

Pin No.	a row	c row
1	0V	0V
2	LA (15)	-5V
3	LA (14)	0V
4	LA (13)	0V
5	LA (12)	reserved
6	LA (11)	notMS
7	LA (10)	reserved
8	LA (9)	reserved
9	LA (8)	reserved
10	LA (7)	reserved
11	LA (6)	reserved
12	LA (5)	notRST
13	LA (4)	PRnotW
14	LA (3)	notPWE
15	LA (2)	notPRE
16	BD (15)	notPIRQ
17	BD (14)	notPFIQ
18	BD (13)	reserved
19	BD (12)	C1 – IIC clock
20	BD (11)	Co – IIC data
21	BD (10)	notEXTPS
22	BD (9)	notPS
23	BD (8)	notIOGT
24	BD (7)	notIORQ
25	BD (6)	notBL
26	BD (5)	0V
27	BD (4)	CLK ₂
28	BD (3)	CLK ₈
29	BD (2)	REF8M
30	BD (1)	+5V
31	BD (0)	reserved
32	+5V	+12V

Table 2. Expansion bus interface

achieved using the byte form of the relevant ARM instruction – LDRB, STRB.

Transfers of 16 bits at a time must be made using the word form of the ARM instruction, reading data from the lower 16 bits (the upper 16 being invalid) and writing to the upper 16 bits (the lower holding a duplicate for future compatibility).

This contrivance is enforced by the way the hardware on the main circuit board is designed.

Interface decoding

All expansion slots receive the 16-bit input/output data bus BDo-BD15 and 14 bits of the latched address bus LA2-LA15. Only the address lines from LA2 upwards are present because the hardware makes full 32-bit word transfers so the bottom two address bits (LA1 and LA0) are always zero for word-aligned transfers.

At each expansion slot a number of signals are available which indicate the nature of any data transfer to or from the card. Decoding circuitry on the backplane produces an 'active-low' signal to each slot called 'Podule Select' (notPS). Whenever an address in the region reserved for a particular slot is accessed this signal is driven low, to zero Volts.

At the same time one or other of the Podule Read Enable (notPRE) or Podule Write Enable (notPWE) signals is also driven low to indicate the direction of data transfer.

A single Podule Read/not Write a signal (PRnotW) is also available for devices which require it.

The expansion connectors are known as 'DIN 41612ac' connectors which have two rows of 32 pins. The full expansion connector interface definition is shown in Table 2.

It is important to note that all pins marked 'reserved' must not be used since they carry co-processor interface signals in suitably equipped machines.

Constructing interfaces

By following the guidelines set out so far it is possible to construct simple expansion cards with just a handful of components. Let's see what is required to address each of the requirements already noted above, in turn.

To begin with we must buffer the address and control lines (LA2-LA13, notPS, notPRE, notPWE, PRnotW). This is easily achieved with two octal (eight-way) buffers. Since the Archimedes

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is constructed from CMOS circuitry it is best to use the same kind for interfacing. The devices of choice are therefore two 74HC541 octal buffers.

The data bus must also be buffered, usually just the least significant eight bits for a simple expansion card. A single 74HC245 bi-directional octal buffer IC does this job. Its enable pin may be driven from notPS (which goes low when our expansion card is selected) and its direction control pin from the buffered PRnotW signal.

Each expansion card has its own 4K address space into which both on-board software and hardware must fit.

A common way to divide the address space is to reserve the bottom 2K for software and use the top 2K for the expansion card devices.

This arrangement is elegant because the top address line (LA13) will directly signify an access to the hardware part of the address space with a high value along with an access to the software part with a low value.

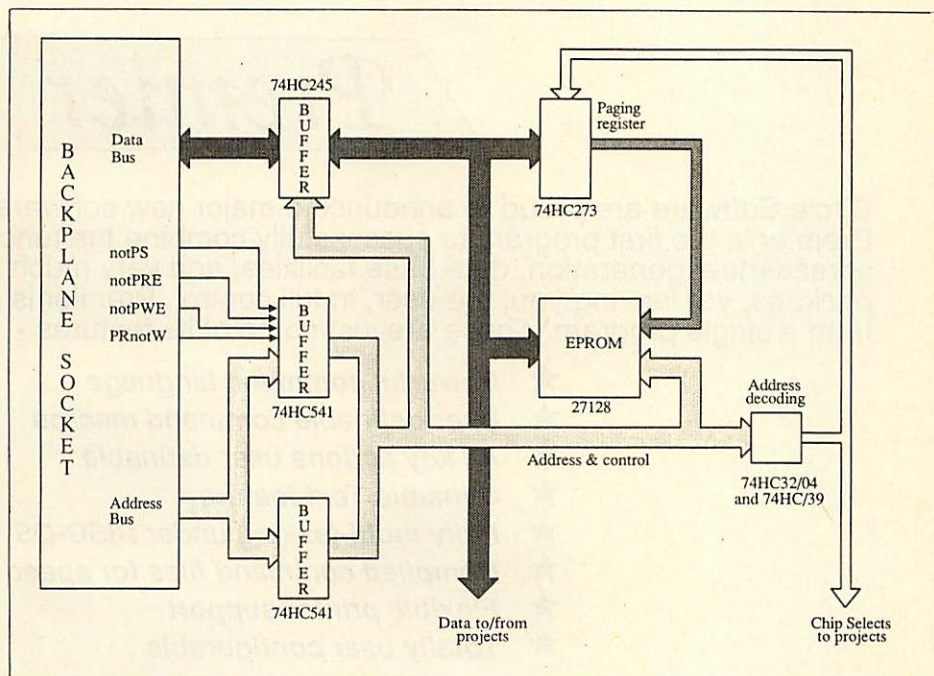
To generate a chip select signal for each of the ICs in your project design you need to gate together the select signal, direction signals and address line LA13. Because all your signals can be made active-low (invert the LA13 address), OR gates may be used throughout. The logic equations are as follows:

$$\begin{aligned} \text{notValidRead} &= (\text{notPS OR notPRE}) \\ &\text{OR notLA}_{13} \\ \text{notValidWrite} &= (\text{notPS OR notPWE}) \\ &\text{OR notLA}_{13} \end{aligned}$$

This requires just four OR gates and an inverter to produce the two active-low 'valid' signals.

For devices which require a single RnotW signal we can simply AND the two 'valid' signals together, using either an AND gate or a NAND gate followed by another NAND gate wired as an inverter. You are likely to want to use several ICs so it is normal to use the 'valid' signals derived above to drive decoding devices which further subdivide the hardware address space. An excellent choice is the 74HC139 which contains a pair of two-to-four line decoders, providing four valid signals each describing 512-word sections each for reading and writing.

Because the address space available for each expansion card is so small (and further reduced by allowing half of it for hardware as just described) you need a



Block diagram of a podule expansion slot

simple system for increasing the space.

In keeping with Acorn traditions a 'paging' system is usually used whereby one of several 2K 'pages' of memory is accessible in the lower 2K of the expansion card address space at any moment. This allows much larger memory devices to be fitted to the expansion card by providing several 2K pages within the device.

For such a paging system, all that is required is a writeable latch to contain the 'page number' of the selected region of memory. To conform to the expansion card specification you must be able to clear this latch when the computer is reset. Just such a clearable latch is provided by a 74HC273.

The enable signal which allows this latch to be loaded from the data bus would normally be driven by one of the valid write signals we derived earlier. This allows software to 'page' the memory device and indirectly access all its addresses.

The storage of software on an expansion card (to allow it to install itself immediately the computer is turned on) is outside the scope of this article. However, a concise summary of the techniques involved appeared in the Agora section of *BBC Acorn User* in October and December 1988.

If you wish to write your own expansion card software you would do well to refer to these issues.

For the purpose of these articles an EPROM has been developed containing a

series of routines which may be accessed using the Basic command SYS. These routines allow Basic programs to directly control hardware fitted to an expansion card following the design described above and will form the basis of programs in future articles.

You have seen that the Archimedes allows up to four expansion cards to be attached to the computer. By following a simple set of guidelines, it is possible to attach almost any kind of electronic circuitry to the computer. The block diagram summarises the overall structure of this interface circuitry.

In the next article we will examine the construction of a general-purpose expansion card and in subsequent articles a number of simple constructional projects will be described, along with more detailed information about the expansion card interface specification.

To allow simple projects to be constructed without the need to rebuild the interface circuitry each time, a prototyping card has been designed to accompany these articles. The Archimedes Prototyping Expansion Card (Apec) is available either as a bare PCB or with a ready-constructed interface. It has over 65 per cent of its area laid out as 0.1in pitch square pads to allow your own circuitry to be constructed. Apec costs £25 for the bare printed circuit board with a pre-programmed EPROM and £35 for the ready-built version with EPROM. Both prices are exclusive of VAT and postage. The Apec cards are available from Atomwide, 23 The Greenway, Orpington, Kent. Tel: (0689) 38852.

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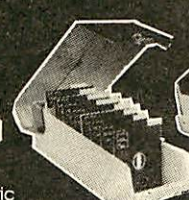
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DATA BANKING

As the National Curriculum comes into force, you may find use for NERIS – the complete on-line database for teachers

Chris Drage and Nick Evans

The impact of the new National Curriculum is about to be felt by teachers across the entire country in all phases of education and in all curricular areas. The necessity for materials to fulfil aspects of the new curriculum will be keenly felt, especially in those areas with which teachers are less familiar.

Sources of information will be at a premium and although traditional resources will still be valid for many tasks, new areas require new materials for teaching and learning. A significant (and, at present, government-funded) enterprise is NERIS, the National Educational Resources Information Service.

What is NERIS?

Neris has been set up to provide teachers with on-line access to curricular information, resources and references. 'On-line' means that it is accessible by means of a computer and modem via a telephone line to another large-scale machine at a remote place – in this case, the Open University computer.

Once the user is connected to the NERIS system, it is possible to sift through its records and abstract either actual teaching materials, which may be downloaded and saved into the user's wordprocessor, or references to material available from other sources.

Currently, NERIS is used by about 4500 institutions or individuals and it has upwards of 17,500 records on file with new records being added at the rate of 1000 to 1500 each month. NERIS is run by the NERIS Trust which is grant-aided by the Department of Trade and Industry but the DTI has announced its intention to withdraw its support gradually up to 1992 when the system is designated to be self-supporting.

This appears to be a small-minded plan

on the part of national government. Not only does it provide an immediate disincentive to use by proposing a subscription charge but government is actually placing barriers in the way of something which could enhance the quality of education across the board.

The recently announced funding amounted to £410,000 over three years. That is the real cost of providing support to schools and teachers, keeping them in touch with the latest educational developments, allowing them access to high-quality information. The same funding also promotes the employment of the new educational technology which we proudly claim to lead the world. If all this is true then it seems a very small price to pay per year in terms of the government's expenditure on other projects which, in some people's eyes, might seem more trivial.

In fact, £20,000 of this year's allocation is being spent on a research project, run by NCET (National Council for Educational Technology) which aims to assess the needs of the users in terms of the service being provided and the relationship of the service to the National Curriculum. In this it is identifying what new information or restructuring of existing data will be necessary 'to accommodate the attainment targets, programmes of study and the framework for assessment and testing'.

Gaining access to NERIS is easy enough, particularly if you already use on-line systems such as Telecom Gold, Campus 2000 (TTNS) or PRESTEL. It used to be possible to move directly into NERIS from TTNS but that service closed as of March 31, 1989. However, to gain access via Prestel, it is simply a matter of typing *NERIS which will then open up the NERIS system with no additional charge to the user.

It is also possible to dial direct into the system but for that you must have a user number and a password. These are available from your LEA NERIS co-ordinator free of charge provided you are a bona fide educational user.

If all else fails, it is possible to buy direct access for £35 from NERIS itself. The only further cost to the user is the telephone call necessary to link the computers together.

Information

It should be made clear at this point that the information available on NERIS is biased towards the secondary school. However, much of it is of equal relevance to the upper primary areas as well. Almost certainly one of the outcomes of the NCET research project will be to recommend that the scope of the database is extended to include a good deal more primary references.

Each record consists of a number of headings or 'fields' which contain specific information. Therefore any record will specify basic bibliographic information about the resource being examined in the following format:

Title as published
Media type of medium
Author or editor, designer or producer
Series series title
Publisher name of publisher
Published date of publication

There then follows descriptive information relating to the content and the material's availability (suppliers, prices, etc). A further field may contain an abstract from the resource, a summary of keywords which may be used in retrieving the record from the datafile or even the entire resource itself.

So, it is possible for the user to select records according to a number of criteria and either print them directly or

download the entire resource for later processing from disc.

Naturally, a large and growing body of information such as NERIS does not just generate itself. With the best will in the world, the co-ordinators and researchers at NERIS would not be able to discover, develop and process the volumes of specialist curricular materials that are already present on the system. It has been necessary to gain the support of suitable educational organisations and industry to provide information.

Using the system

There are two levels at which the user can gain access to NERIS's information. At the simple search level, three criteria are entered to determine the Interest Area of your search, the Media which you are interested in and the Age Phase of the pupils at whom the information is to be aimed.

The query is defined on the screen by filling in the data at the relevant place and setting the search in motion. The system then indicates the number of references found and the headings under which they appear. This enables the user to see not only the areas they think are associated with the chosen topic but also other related areas which may not have occurred to them.

An alphabetic wordlist which provides a direct access to topics of interest is also available. More interestingly perhaps, there is a thesaurus facility available with the Extended Search system which allows teachers to examine related themes and topics that spring out of their original choice. This facility is invaluable in developing topic work and relating cross-curricular issues.

Like any new system available for schools, there is a training overhead which must be met by the school or by LEA training organisations. NERIS provides a range of support materials to allow both local and regional INSET courses to be undertaken.

The NERIS Videotex Guide (£3.50) is a tutorial which helps users get to grips with the system through a progressive and well-illustrated set of materials. To augment that, there is the NERIS Tutorial Software which allows the users to have experience of NERIS off-line – that is, without being connected to the Open University computer – this can save on phone bills. *Marvel II* is the software which provides the facilities to

download NERIS files and prepare them for word processing. It will handle graphics, text and data files and works on the BBC micro and Nimbus.

Partners for Learning is a document written by teachers in North Yorkshire which catalogues the progress of individuals in their use of NERIS and the ways in which it has enhanced their teaching. This document is particularly valuable in examining issues raised by the introduction of this type of technology.

All of these items are contained in some quantity in both of the main

reference cards, two search guides, two copies of *Partners for Learning* as well as the tutorial software and *Marvel II*.

All of the above are available from the NERIS address.

CD-Rom

Of course, not everyone has the facilities to go on-line. If this is the case there is a stand-alone version of NERIS which is updated on a regular basis.

This is the CD-Rom version which, although not yet present as a system facility in many places as yet, is likely to become a major educational resource in the near future. CD-Rom uses compact disc technology, not for music, but for the storage and retrieval of data.

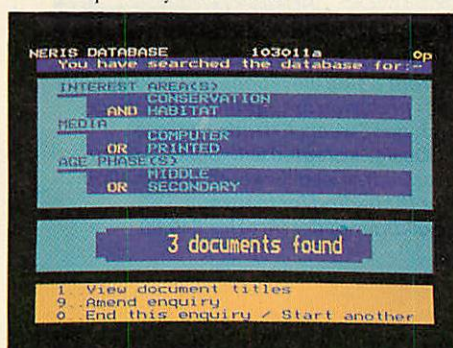
Huge quantities of information may be stored on one disc and this may be accessed using a computer and a suitable CD drive. Unfortunately it is not simply a matter of connecting the music department's CD up to the BBC B. However, the price of the equipment is falling rapidly and the availability of such useful resources as NERIS as well as other systems which are in the pipeline, makes the potential of CD-Rom in schools very high indeed. Using the CD-ROM version of NERIS, it is possible to abstract resources from the CD and transfer them to floppy disc for use in the classroom.

In order to use this system a true IBM PC compatible is needed with 512K of memory, a single disc drive and monochrome display. The software is driven with a mouse and output can be sent to disc or to an Epson compatible printer.

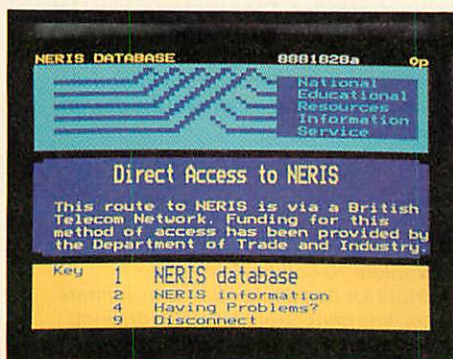
NERIS is one of the most important resources developed for education in the last 20 years. It is growing all the time and there are plans to provide easy access so information can be supplied to the database as well as retrieved.

The success of the venture will depend upon the commitment of either the national funding or the LEAs to providing finance to keep the system active at a reasonable level. Like all other things, if it is to rely on schools' direct funding then it is unlikely to be supported, other than in a patchy fashion.

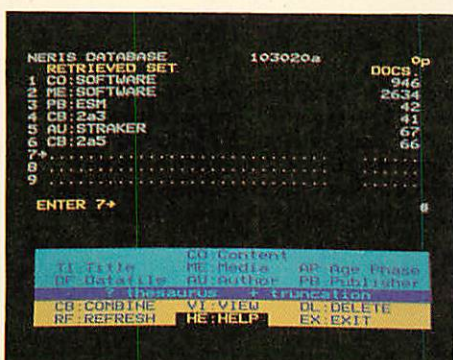
If schools had to pay libraries to use their books then the level of use of topic sets and bulk loans would diminish rapidly. NERIS must be supported, exploited in conjunction with the needs of the National Curriculum and brought into the line of sight of as many teachers as is possible.



NERIS: database on-line to Open University



Both academics and industry contribute data



The system is also available on CD Rom

training resources provided by NERIS: The NERIS INSET Pack (£55 +VAT) contains 10 copies of each of the search guides and reference cards as well as a copy of the tutorial software, *Marvel II* and the two copies of *Partners for Learning*. Whereas the NERIS School Starter Pack (£30 +VAT) contains two

SOFTWARE FOR THE ARCHIMEDES & BBC

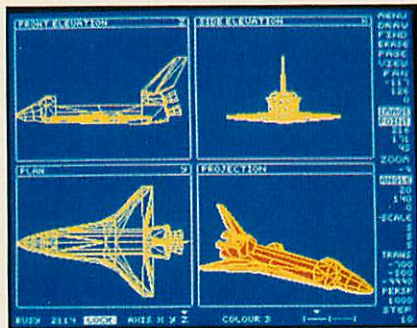
```

PEDIT
DRAW
F 240
BPAID
PASC
DOCCO
P PUT
    11
    18
    9
    1000
    1000
ZOOM
    -4
ANGLE
    52
    230
    0
SCALE
    8
    10
    10
TRANSP
    "NO"
-5544
PERIOD
    1625
STEP

```

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YELLOW PAGES

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/Turbo	ADFS	Econet	Shadow RAM	Monthly T/D
Arc Agora	22											
Listings 1-3							■		■	■	■	■
Hints & Tips	25											
Listings 1-2		■	■	■	■	■		■	■	■	■	■
Listings 3-7(1)				■	■			■	■	■	■	■
Colliding Galaxies	58											
Listing 1			■	■	■		■	■	■	■	■	■
Check it out	65											
Listing 1(2)		■	■	■	■	■	■	■	■	■	■	■
Get the fax	72											
Listing 1			■	■	■		■	■	■		■	■

Note 1. Requires StopPress. 2. Requires Wordwise Plus.

ARC AGORA

See Archimedes Agora, page 22

Listing 1. Quicklines

```

10 REM Agora - listing 1
20 REM Fast lines
30 REM by Phil Lewis
40 REM for Archimedes only
50 REM (c) BAU July 1989
60 :
70 MODE 13
80 PRINT TAB(10);"Fast lines"
90 PRINT "" "Do you want range checkin
g? (Y/N) ";
100 REPEAT
110 A%=GET AND 223
120 UNTIL A%=89 OR A%=78
130 flag=(A%=89)
140 DIM code% 1000,vdu% 16
150 !vdu%=149
160 vdu%!4=-1
170 SYS "OS_ReadVduVariables",vdu%,vdu
%+8
180 CLS
190 OFF
200 sx=0:sy=1:ex=2:ey=3:col=4
210 dx=12:dy=5:sty=6:et=7
220 temp=8:sc=9:ad=10:base=11
230 sp=13:link=14:pc=15
240 FOR pass%=0 TO 2 STEP 2
250 P%=code%
260 !OPT pass%
270 .line
280 LDR base,screen
290 CMPS sx,ex
300 MOVGT temp,sx
310 MOVGT sx,ex
320 MOVGT ex,temp
330 MOVGT temp,sy
340 MOVGT sy,ey
350 MOVGT ey,temp
360 SUB dx,ex,sx
370 SUBS dy,ey,sy
380 MVNLT dy,dy
390 CMPS ey,sy
400 MOVGE sty,#1
410 MVNLT sty,#0
420 MOV et,#1
430 CMPS dx,dy
440 MOVGT sc,dx,LSR #1
450 MOVLE sc,dy,LSR #1
460 BLE loop2
470 .loop1
480 FNplot(flag)
490 SUBS et,ex,sx
500 BEQ end
510 ADD sx,sx,#1
520 SUBS sc,sc,dy
530 BGE loop1
540 ADDLE sc,sc,dx
550 ADDLE sy,sy,sty
560 B loop1
570 .loop2
580 FNplot(flag)
590 SUBS et,ey,sy
600 BEQ end
610 ADD sy,sy,sty
620 SUBS sc,sc,dx
630 BGE loop2
640 ADDLE sc,sc,dy
650 ADDLE sx,sx,#1
660 B loop2
670 .end
680 MOV pc,link
690 :
700 .screen
710 EQUd vdu%!8
720 ]

```

Continued ►

YELLOW PAGES

A R C A G O R A

◀ Arc Agora, listing 1 continued

```

730 NEXT pass%
740 TIME=0
750 FOR i%=1 TO 1000
760 GCOL 0,RND(255)
770 LINE RND(1279),RND(1023),RND(1279)
,RND(1023)
780 NEXT
790 t=TIME
800 PRINT "Basic took ";t/100;" secs -
press a key"
810 kk=GET
820 CLS
830 TIME=0
840 FOR i%=1 TO 1000
850 A%=RND(319)
860 B%=RND(255)
870 C%=RND(319)
880 D%=RND(255)
890 E%=RND(255)
900 CALL line

910 NEXT
920 t=TIME
930 PRINT "ARM code took ";t/100;" sec
s"
940 END
950 :
960 DEF FNplot(d%)
970 IF d% THEN
980 [OPT pass%
990 CMP sx,#320
1000 BCS P%+24
1010 CMP sy,#256
1020 BCS P%+16
1030 ]
1040 ENDIF
1050 [OPT pass%
1060 ADD ad,base,sy,ASL #6
1070 ADD ad,ad,sy,ASL #8
1080 STRB col,[ad,sx]
1090 ]
1100 =""

```

Listing 2. 'Print Using' simulation

```

10 REM Agora - listing 2
20 REM 'Print Using' procedures
30 REM by Nagpal Hoysal
40 REM for Archimedes only
50 REM (c) BAU July 1989
60 :
70 DEF PROCPrintUsingHelp
80 PRINT ""
90 PRINT "PROCLPrintUsing(<string>,<s
tring>)"
100 PRINT "executes equivalent of PRIN
T USING... on other machines."
110 PRINT "First string is of form '##
#.#;#.#;'"
120 PRINT " # represents a digit"
130 PRINT " . represents a decimal poi
nt"
140 PRINT " ; represents follow-on num
ber"
150 PRINT " : terminates sequence"
160 PRINT "Second string contains name
s of variables to be displayed."
170 PRINT ""
180 ENDPROC
190 :
200 DEF PROCPrintUsing(Lu$,Lvarlist$,L
210 LOCAL Lfieldwidth%,Ldecimalflag%,L
decimal%,L%
220 FOR L%=1 TO LEN(Lu$)
230 CASE ASC(MID$(Lu$,L%,1)) OF
240 WHEN 35:Lfieldwidth%+=1:IF Ldecima
lflag% THEN Ldecimal%+=1
250 WHEN 46:Lfieldwidth%+=1:Ldecimalfl
ag%=TRUE
260 WHEN 58:PROCLprint(Lfieldwidth%,Ld
ecimal%,Ldecimalflag%):ENDPROC
270 WHEN 59:PROCLprint(Lfieldwidth%,Ld
ecimal%,Ldecimalflag%):Lfieldwidth%=0:Ld
ecimalflag%=FALSE:Ldecimal%=0
280 ENDCASE
290 NEXT L%
300 ENDPROC
310 :
320 DEF PROCprint(Lfieldwidth%,Ldecim
al%,Ldecimalflag%)
330 Lformat%=0
340 IF Ldecimalflag% THEN Lformat%=&20
000+(Ldecimal%*100)
350 Lformat%+=Lfieldwidth%
360 @%=Lformat%
370 PRINT EVAL(LEFT$(Lvarlist$,INSTR(L
varlist$,";")-1));
380 Lvarlist%=MID$(Lvarlist$,INSTR(Lva
rlist$,";")+1)
390 ENDPROC

```

Listing 3. 'Print Using' demonstration

```

10 REM Agora - listing 3
20 REM 'Print Using' demo
30 REM by Nagpal Hoysal
40 REM for Archimedes only
50 REM (c) BAU July 1989
60 :
70 MODE 12
80 LIBRARY "Agora2"
90 PROCPrintUsingHelp
100 DIM vars(4,4)
110 FOR x%=0 TO 4
120 FOR y%=0 TO 4
130 vars(x%,y%)=RND(1280)/10
140 NEXT y%
150 NEXT x%
160 PROCTest("###;####.#;####.#;####.#;
###.#;";
170 PROCTest("###;####.#;####.#;####.#;
###.#;####.#;")
180 END
190 :
200 DEF PROCtest(form$)
210 PRINT "Format: ";form$
220 FOR y%=0 TO 4
230 var$="y%";
240 FOR x%=0 TO 4
250 var$+="vars("+STR$x%+", "+STR$y%+"
);"
260 NEXT x%
270 PROCPrintUsing(form$,var$)
280 PRINT
290 NEXT y%
300 ENDPROC

```


YELLOW PAGES

A R C A G O R A

Listing 4. Digital snow

```

10 REM Agora - listing 4
20 REM Snow doodle
30 REM by Dave Lawrence
40 REM for Archimedes only
50 REM (c) BAU July 1989
60 :
70 ON ERROR IF INKEY=1 OR ERR<>17 MOD
E 0:PRINTREPORT$" at line ";ERL:END ELSE
RUN
80 MODE 13
90 OFF
100 dots=800
110 DIM code 320,table dots*20
120 !code=148:code!4=-1
130 SYS "OS_ReadVduVariables",code,cod
e
140 scrst=!code
150 xmax=80:ymax=20
160 max=5:pixels=320
170 log=9
180 :
190 temp0=0:temp1=1
200 old=2:col=3:dir=4:speed=5:flag=6
210 addr=7:count=8:seed=9
220 xor=10:zero=11:times=12
230 sp=13:link=14:pc=15
240 FOR pass%=0 TO 2 STEP 2:PC%=code
250 [OPT pass%
260 .go
270 MOV zero,#0
280 LDR seed,aseed
290 LDR xor,axor
300 .fall
310 MOV temp0,#19
320 SWI "OS_Byte"
330 MOV count,#dots
340 ADR addr,table
350 .foreach
360 LDMIA addr,{old,col,dir,speed,flag
}
370 MOV times,speed
380 .again
390 LDRB temp0,[old,#pixels]
400 CMP temp0,#0
410 MOVEQ dir,#pixels
420 CMP dir,#0
430 BNE notwaiting
440 SUBS flag,flag,#1
450 BNE waiton
460 .rand
470 MOV temp0,#0
480 MOV temp1,#log
490 .rand1
500 MOVS seed,seed,LSL #1
510 EORCS seed,seed,xor
520 ADC temp0,temp0,temp0
530 SUBS temp1,temp1,#1
540 BNE rand1
550 ADD temp0,temp0,#2
560 CMP temp0,#pixels
570 BGE rand
580 LDR old,tlhc
590 ADD old,old,temp0
600 MOV dir,#pixels
610 B stop
620 .notwaiting
630 LDRB temp0,[old,dir]
640 CMP temp0,#0
650 BEQ move
660 MOVS seed,seed,LSL #1
670 EORCS seed,seed,xor
680 MOVCC dir,#1
690 MVNCS dir,#0
700 LDRB temp0,[old,dir]
710 CMP temp0,#0
720 BEQ move
730 RSB dir,dir,#0
740 LDRB temp0,[old,dir]
750 CMP temp0,#0
760 BEQ move
770 MOV dir,#0
780 MOV flag,#4
790 B waiton
800 .move
810 STRB zero,[old]
820 STRB col,[old,dir]!
830 .stop
840 SUBS times,times,#1
850 BNE again
860 .waiton
870 STMIA (addr)!,{old,col,dir,speed,f
lag}
880 SUBS count,count,#1
890 BNE foreach
900 SWI "OS_ReadEscapeState"
910 BCC fall
920 MOV pc,link
930 :
940 .tlhc
950 EQU D scrst+pixels-1
960 .aseed
970 EQU D TIME
980 .axor
990 EQU D &1D872B41
1000 J
1010 NEXT pass%
1020 :
1030 RECTANGLE 0,0,1279,1023
1040 *POINTER 1
1050 REPEAT
1060 MOUSE x1,y1,z
1070 IF z AND 4 THEN
1080 MOVE x1,y1
1090 REPEAT
1100 MOUSE x2,y2,z
1110 DRAW x2,y2
1120 UNTIL z=0
1130 ENDIF
1140 IF z AND 2 THEN
1150 MOVE x1,y1
1160 MOVE BY RND(xmax*2)-xmax,RND(ymax*
2)-ymax
1170 PLOT B1,RND(xmax*2)-xmax,RND(ymax*
2)-ymax
1180 REPEAT
1190 MOUSE x,y,z
1200 UNTIL z=0
1210 ENDIF
1220 UNTIL z AND 1
1230 *POINTER 0
1240 FOR i%=0 TO dots-1
1250 REPEAT
1260 ad=scrst+RND(10*pixels)
1270 UNTIL ?ad=0
1280 !(table+i%*20)=ad
1290 !(table+i%*20+4)=RND(256)
1300 !(table+i%*20+8)=pixels
1310 IF max=1 vel=1 ELSE vel=RND(max)
1320 !(table+i%*20+12)=vel
1330 NEXT
1340 CALL go

```


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HINTS & TIPS

See Hints & Tips, page 26

Listing 1. AMX to NLQ converter

```

10 REM NLQ Font conversion
20 REM by Robin Barnes
30 REM for B/B+/E/M/C
40 REM (c) Acorn User Jul 89
50 :
60 MODE 7
70 descend$="gjpqy"
80 VDU 23,1,0;0;0;0;
90 INPUT "Please Enter Font name :-"n
ame$
100 INPUT "Please Enter save name :-"s
ave$
110 CLS
120 PROCcode
130 PROCload(name$)
140 PROCconvert
150 PROCsend
160 END
170 :
180 DEF PROCcode
190 *FX 3,6
200 DIM mc% 100
210 FOR opt%=0 TO 2 STEP 2
220 P%=mc%
230 [
240 OPT opt%
250 .start
260 LDY #0
270 LDA #0
280 .loop
290 CLC
300 ASL &70
310 ROL A
320 ASL &71
330 ROL A
340 ASL &72
350 ROL A
360 ASL &73
370 ROL A
380 ASL &74
390 ROL A
400 ASL &75
410 ROL A
420 ASL &76
430 ROL A
440 ASL &77
450 ROL A
460 STA &78,Y
470 INY
480 CPY #&08
490 BNE loop
500 LDY #0
510 .replace
520 LDA &78,Y
530 STA &70,Y
540 INY
550 CPY #8
560 BNE replace
570 RTS
580 :
590 ]
600 NEXT opt%
610 *FX 3,0
620 ENDPROC
630 :
640 DEF PROCload(name$)
650 OSCLI ("LOAD "+name$+" 6FBA")
660 ENDPROC
670 :
680 DEF PROCconvert
690 start%=&7000
700 end%=&7B40
710 PRINT "Please wait for data to be
reformatted"
720 FOR conv%=start% TO end% STEP 16
730 PROCrotate(conv%)
740 NEXT conv%
750 PRINT "Generating new character se
t"
760 ENDPROC
770 :
780 DEF PROCrotate(start%)
790 FOR next%=0 TO 1
800 strt%=start%+next%
810 FOR loop%=0 TO 15 STEP 2
820 byte%=(strt%+loop%)
830 ?(&70+(loop% DIV 2))=byte%
840 NEXT loop%
850 CALL start
860 FOR loop%=0 TO 7
870 byte%=(&70+loop%)
880 add%=&6000+((start%-&7000)+(next%*
8))
890 ?(add%+loop%)=byte%
900 NEXT loop%
910 NEXT next%
920 ENDPROC
930 :
940 DEF PROCsend
950 FOR loop%=34 TO 124
960 PROCredefine(loop%)
970 NEXT loop%
980 OSCLI("SAVE "+save$+" 4000+10E0 60
00")
990 ENDPROC
1000 :
1010 DEF PROCredefine(char%)
1020 add%=char%-34
1030 address%=&6000+(add%*32)
1040 store%=&4000+(add%*48)+2
1050 PROCreformat(2,0,3)
1060 PROCreformat(4,4,10)
1070 PROCreformat(2,11,15)
1080 store%=&4000+(add%*48)+2
1090 desc$=ABS(NOT INSTR(descend$,CHR$
(char%)))>0)
1100 start%=-1;end%=-1
1110 FOR chk%=0 TO 23
1120 byte%=(store%+(chk%*16))
1130 IF byte%>0 AND start%=-1 THEN star
t%=chk%
1140 IF byte%=0 AND start%>-1 AND end%=-
1 AND chk%>start%+5 THEN end%=chk%
1150 store%=store%+2
1160 NEXT chk%
1170 start%=start%-2
1180 end%=end%+2
1190 IF start%>14 THEN start%=14
1200 IF end%>23 THEN end%=23
1210 IF start%<0 THEN start%=0
1220 IF end%<0 THEN end%=23
1230 store%=&4000+(add%*48)
1240 ?store%=start%+(desc$*128)
1250 ?(store%+1)=end%
1260 ENDPROC
1270 :
1280 DEF PROCreformat(step%,strt%,end%)
1290 FOR str%=strt% TO end%
1300 high%=(address%+str%)
1310 low%=(address%+&10+str%)
1320 ?store%=high%
1330 ?(store%+1)=low%
1340 IF step%>2 THEN ?(store%+2)=high%
1350 IF step%>2 THEN ?(store%+3)=low%
1360 store%=store%+step%
1370 NEXT str%
1380 ENDPROC

```


YELLOW PAGES

HINTS & TIPS

Listing 2. Font Test

```

10 REM NLQ Font Test
20 REM by Robin Barnes
30 REM for B/B+/E/M/C
40 REM (c) Acorn User Jul 89
50 :
60 MODE 7
70 VDU 23,1,0;0;0;0;
80 INPUT "Please enter font name : "
name$
90 INPUT "Test alphabet (Y/N) " test$
100 T%=(test$="Y")
110 PROCprint(name$)
120 IF T%=0 GOTO 210
130 *FX 3,10
140 VDU 27,37,1,0,27,112,1
150 FOR prt%=34 TO 123
160 VDU prt%
170 IF (prt%-33)MOD 45=0 THEN VDU 10,1
3
180 NEXT prt%
190 VDU 10,13

200 *FX 3,0
210 END
220 :
230 DEF PROCprint(name$)
240 OSCLI("LOAD "+name$+" 6000")
250 *FX 3,10
260 VDU 27,64
270 VDU 27,40
280 IF T% PRINT 'name$;' - ''
290 char%=34
300 FOR loop%=&6000 TO &70E0 STEP 48
310 VDU 27,38,0,char%,char%
320 FOR stp%=0 TO 47
330 VDU ?(loop%+stp%)
340 NEXT stp%
350 VDU 0,0
360 char%=char%+1
370 NEXT loop%
380 *FX 3,0
390 ENDPROC

```

Listing 3. *Basic maker

10 REM * BASIC MAKE	270 LDX #0	580 LDX #0
20 REM by D Aylott	280 LDY #79	590 JSR osbyte
30 REM for M/C	290 JSR osbyte	600 TYA
40 REM (c) Acorn User	300 LDY #76	610 PLY
Jul 89	310 JSR osbyte	620 BRA count
50 :	320 LDY #68	630 .next
60 argc=&70	330 JSR osbyte	640 LDA #&D
70 PROCoscalls	340 LDY #13	650 PHY
80 DIM gap% 200	350 JSR osbyte	660 TAY
90 PROCassemble("M.CO	360 LDY #82	670 LDA #138
DE",gap%,gap%)	370 JSR osbyte	680 LDX #0
100 END	380 LDY #85	690 JSR osbyte
110 :	390 JSR osbyte	700 TYA
120 DEF PROCoscalls	400 LDY #78	710 PLY
130 gsinit=&FFC2	410 JSR osbyte	720 BRA arg
140 gsread=&FFC5	420 LDY #13	730 .endcnt
150 oswrch=&FFEE	430 JSR osbyte	740 LDY #13
160 osbyte=&FFF4	440 LDY #0	750 LDA #138
170 ENDPROC	450 .arg	760 LDX #0
180 :	460 SEC	770 JSR osbyte
190 DEF PROCassemble(F	470 JSR gsinit	780 .exit
\$,laddr%,eaddr%)	480 BEQ exit	790 RTS
200 LOCAL pass%,P%,0%	490 INC argc	800 J
210 FOR pass%=4 TO 6 S	500 .count	810 NEXT pass%
TEP 2	510 JSR gsread	820 OSCLI("SAVE "+F\$+"
220 P%=eaddr%:0%=laddr	520 BCS endcnt	"+STR\$~(laddr%)+ " "+STR
%	530 CMP #&20	\$~(0%)+ " "+STR\$~(eaddr%)
230 COPT pass%	540 BEQ next)
240 LDA #0	550 PHY	830 ENDPROC
250 STA argc	560 TAY	
260 LDA #138	570 LDA #138	

Listing 4. *Basic converter

```

10 REM * BASIC CONVERT
20 REM by D Aylott
30 REM for M/C only
40 REM (c) Acorn User Jul 89
50 :
60 MODE 135
70 DIM B% &4000
80 INPUT "BASIC program name : " B$
90 INPUT "Save '*' version as : " S$
100 IF S$="" THEN S$="S."+B$
110 X%=OPENIN B$
120 IF X%=0 THEN PRINT "Can't find ";B
$:END
130 L%=EXT# X%
140 top%=B%+L%

150 CLOSE# X%
160 PROCa("LOAD "+B$+" "+STR$~B$)
170 PROCa("LOAD M.CODE "+STR$~top%)
180 PROCa("SAVE "+S$+" "+STR$~B$+" "+S
TR$~(top%+&6A)+ " "+STR$~(PAGE+L%)+ " "+ST
R$~PAGE)
190 PRINT "Program converted : type #"
;S$;" <parameters ....> to run"
200 END
210 :
220 DEF PROCa(a$)
230 PRINT a$
240 OSCLI a$
250 ENDPROC

```


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HINTS & TIPS

Listing 5. Demonstration 1

```

10 REM * BASIC PROG1
20 REM by D Aylott
30 REM for M/C
40 REM (c) Acorn User Jul 89
50 :
60 MODE 7
70 PRINT "This is PROG1"
80 INPUT "How many parameters to pass
",A%
90 p$="PROG2"
100 IF A%<1 GOTO 180
110 FOR I%=1 TO A%
120 INPUT "Enter a parameter: " a$
130 p$=p$+" "+a$

140 NEXT I%
150 PRINT "These parameters will now
be passed"
160 PRINT "to the second program where
they"
170 PRINT "will be printed out."
180 PRINT "Press any key to continue..
";
190 *FX 21,0
200 REPEAT UNTIL GET
210 PAGE=&3000
220 OSCLI(p$)
230 END

```

Listing 6. Demonstration 2

```

10 REM * BASIC PROG2
20 REM by D Aylott
30 REM for M/C
40 REM (c) Acorn User Jul 89
50 :
60 argc%=?&70
70 DIM A$(argc%)
80 PROCrdargs(argc%)
90 MODE 7
100 PRINT "This is "A$(1)
110 PRINT "The ";argc%-1;" parameters
which you passed were:"
120 PROCwrargs(argc%)
130 PRINT
140 PRINT "Now type 'CHAIN ""MENU"" or
*MENU a1'."
150 PRINT "This demonstrates that an
existing"
160 PRINT "program can be used without
alteration."
170 PRINT "a1 is optional. 1,2,3 or 0
are valid,"
180 PRINT "other parameters are ignore
d."
190 END
200 :
210 DEF PROCwrargs(A%)
220 IF A%<2 THEN PRINT "None":ENDPROC
230 FOR I%=2 TO A%
240 PRINT A$(I%)
250 NEXT I%
260 ENDPROC
270 :
280 DEF PROCrdargs(A%)
290 FOR I%=1 TO A%
300 INPUT " " A$(I%)
310 NEXT I%
320 ENDPROC

```

Listing 7. Demonstration 3

```

10 REM * BASIC MENU
20 REM by D Aylott
30 REM for M/C
40 REM (c) Acorn User Jul 89
50 :
60 MODE 7
70 REPEAT
80 C%=FNmenu("DEMO")
90 CLS
100 IF C%=1 THEN PRINT "First choice"
110 IF C%=2 THEN PRINT "Second choice"
120 IF C%=3 THEN PRINT "Third choice"
130 IF C%>0 THEN PROCspace
140 UNTIL C%=0
150 PRINT "Goodbye"
160 END
170 :
180 DEF PROCheading(H$)
190 LOCAL A%,M%,X%,W%,char$
200 W%=40
210 char$="--"
220 M%=FNmode
230 IF M%=0 OR M%=3 THEN W%=80
240 IF M%=2 OR M%=5 THEN W%=20
250 IF M%=7 THEN char$="_"
260 CLS
270 X%=(W%-LEN(H$))/2
280 PRINT STRING$(W%,char$);STRING$(X%
,"*");"> "H$ "<STRING$(W%-POS,"*");STRI
NG$(W%,char$)
290 ENDPROC
300 :
310 DEF FNmode
320 LOCAL A%
330 A%=135
340 =(USR &FFF4 AND &F0000) DIV &10000
350 :
360 DEF FNreply(R$,P%,R%)
370 LOCAL reply%,get%
380 REPEAT
390 REPEAT
400 get%=GET
410 reply%=INSTR(R$,CHR$(get%))
420 UNTIL reply%
430 IF P% THEN PRINT CHR$(get%);
440 IF R% THEN REPEAT get%=GET:UNTIL g
et%=13 OR get%=127
450 IF get%=127 AND P% THEN VDU127
460 UNTIL get%>127
470 =reply%
480 :
490 DEF FNmenu(M$)
500 LOCAL @%,A%,I%,C$
510 @%=9
520 I%=1
530 RESTORE 690
540 PROCheading(M$)
550 PRINT
560 READ C$
570 REPEAT
580 PROCprint(I%,C$)
590 I%=I%+1
600 READ C$
610 UNTIL C$=""

```

Continued ►

YELLOW PAGES

G A L A X I E S

◀ Hints & Tips, listing 7 continued

```

620 PROCprint(0,"Leave the program")
630 FOR A%=0 TO I%-1
640 C$=C$+STR$(A%)
650 NEXT
660 PRINT' 'SPC(4-I%)"Your choice :";
670 =FNreply(C$,TRUE,TRUE)-1
680 :
690 DATA First choice,Second choice,Th
ird choice,""
700 :
710 DEF PROCprint(P%,A%)
720 PRINT P%;" - ";A%
730 ENDPROC
740 :
750 DEF PROCspace

```

```

760 LOCAL M%,X%,Y%
770 *FX 21,0
780 M%=FNmode
790 IF M%=0 OR M%=3 THEN X%=24 ELSE IF
M%=2 OR M%=5 THEN X%=2 ELSE X%=4
800 IF M%=3 OR M%=6 OR M%=7 THEN Y%=24
ELSE Y%=31
810 IF M%=2 OR M%=5 THEN S$="Press SPA
CE bar" ELSE S$="Press the SPACE BAR to
continue"
820 VDU 23,1,0;0;0;0;0;
830 PRINTTAB(X%,Y%)S$;
840 REPEAT UNTIL GET=32
850 VDU 23,1,1;0;0;0;0;
860 ENDPROC

```

See Colliding Galaxies, page 58

Listing 1. Galaxy collision simulator

```

10 REM Galaxy Collision
20 REM by Andrew Rankin
30 REM for B+/M/C/A
40 REM (c) BAU July 1989
50 :
60 MODE 128
70 v$="1.02"
80 DIM x(750),y(750),z(750),u(750),v(
750),w(750)
90 galr=30:galw=5:galri=10:galc%=12
100 m% = 2
110 phase%=1:@%=&50A
120 title$="COLLIDING GALAXIES SIMULAT
ION version "+v$
130 REPEAT
140 ONphase% PROCsetup,PROCsimulation
ELSE
150 UNTIL phase%=3
160 END
170
180 DEF PROCsetup
190 CLS
200 VDU 19,1,4;0;19,0,7;0;
210 PRINT TAB(19,0)title$
220 PRINT " This program simulates
the passing of two galaxies in close
proximity. To"
230 PRINT " simplify calculations o
f star positions it is assumed that
all of the"
240 PRINT " galactic mass is at the c
entre and ignores the gravitational fiel
d due to the"
250 PRINT " surrounding stars. It is
assumed the effects of forces other
than gravity"
260 PRINT " are negligible. The targ
et galaxy is taken to be a disk of sta
rs in stable"
270 PRINT " circular orbit with zero
drift velocity and the intruder is t
aken to be a"
280 PRINT " point of comparable mass.
"
290 :
300 PRINT TAB(1,12)"SET UP:"TAB(1,13)"
In the target galaxy:"
310 INPUT TAB(10,14)"How many rings of
stars are required ",rings%
320 INPUT TAB(10,15)"How many stars pe
r ring are required ",stpr%
330 stars%=stpr%*rings%;dr=(galr-galri

```

```

)/(rings%-1)
340 PRINT " The target galaxy is loca
ted at coordinates (0,0,0) with zero";
350 PRINT " drift velocity,"
360 PRINT " and mass 5.0 mass units.
";stars% stars rotate in circular ";
370 PRINT "orbits of 10 to 30"" di
stance units."
380 PRINT TAB(1,19)"For the intruder g
alaxy:"
390 INPUT TAB(10,20)"Mass as a fractio
n (%) of target galaxy ",massfr
400 INPUT TAB(10,21)"Distance from tar
get galaxy:"TAB(10,22)"X (-70 to 70) ? "
d
410 INPUT TAB(33,22)"Y (-70 to 70) ? "
e TAB(56,22)"Z (-35 to 35) ? "f
420 INPUT TAB(10,23)"Velocity componen
ts:"TAB(10,24)"X ? "r TAB(33,24)"Y ? "
s
430 INPUT TAB(56,24)"Z ? "t
440 PRINT TAB(5,26)"Set up complete -
select (A)lter set up, (R)un simulation"
;
450 PRINT ", (E)xit [ ]"TAB(74,26);
460 REPEAT
470 ans%=GET$
480 PRINT TAB(74,26)ans%;
490 phase%=INSTR("ARE",ans%)
500 UNTIL phase%>0
510 stop%=-1
520 ENDPROC
530
540 DEF PROCsimulation
550 VDU 12,20,19,0,4;0;23,1,0,0,0,0,0,
0,0,0
560 m=galw
570 n=m*massfr/100
580 a=150:b=100:c=0:d=a+d:e=e+b:f=f+c
590 o=0:p=0;q=0
600 T%=0:I%=0:sf=2
610 PRINT TAB(19,0)title$TAB(15,1)"---
-----Target galaxy-----"
620 PRINT TAB(49,1)"-----Intruder ga
laxy-----"
630 PRINT TAB(17,2)"- start:"TAB(35,2)
"- now:"
640 PRINT TAB(51,2)"- start:"TAB(69,2)
"- now:"
650 PRINT TAB(1,3)"Mass"TAB(15,3)m TAB
(31,3)m TAB(49,3)n TAB(65,3)n

```

Continued ▶

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GALAXIES

◀ Colliding Galaxies, listing 1 continued

```

660 PRINT TAB(1,4)"X coordinate"TAB(1,
5)"Y coordinate"TAB(1,6)"Z coordinate"
670 PRINT TAB(1,7)"Velocity (X)"TAB(1,
8)"Velocity (Y)"TAB(1,9)"Velocity (Z)"
680 PRINT TAB(1,11)"X-Y plane"TAB(41,1
1)"X-Z plane (Z shown x 2)"
690 PRINT TAB(70,11)"Time"TAB(15,4)a T
AB(49,4)d TAB(15,5)b TAB(49,5)e
700 PRINT TAB(15,6)c TAB(49,6)f TAB(15
,7)o TAB(49,7)r
710 PRINT TAB(15,8)p TAB(49,8)s TAB(15
,9)q TAB(49,9)t TAB(75,11);T%
720 FOR J%=0 TO rings%-1
730 rad=J%*dr+galri
740 vel=SQR(m/rad)
750 theta=0.5*vel/rad
760 IF J%=0 THEN vel=0.9*vel
770 FOR K%=0 TO stpr%-1
780 g=K%*2*PI/stpr%
790 x(I%)=rad*COS(g)+150
800 y(I%)=rad*SIN(g)+100
810 z(I%)=0
820 w(I%)=0
830 v(I%)=vel*COS(g-theta)
840 u(I%)=-vel*SIN(g-theta)
850 I%=I%+1
860 NEXT: NEXT
870 PROCplotgalaxies
880 PROCkey
890 REPEAT
900 FOR I%=0 TO stars%-1
910 f1=m/((x(I%)-a)^2+(y(I%)-b)^2+(z(I
%)-c)^2+sf)^1.5
920 f2=n/((x(I%)-d)^2+(y(I%)-e)^2+(z(I
%)-f)^2+sf)^1.5
930 ax=f1*(a-x(I%))+f2*(d-x(I%))
940 ay=f1*(b-y(I%))+f2*(e-y(I%))
950 az=f1*(c-z(I%))+f2*(f-z(I%))
960 u(I%)=u(I%)+ax
970 v(I%)=v(I%)+ay
980 w(I%)=w(I%)+az
990 x(I%)=x(I%)+u(I%)
1000 y(I%)=y(I%)+v(I%)
1010 z(I%)=z(I%)+w(I%)
1020 NEXT
1030 rad=((a-d)^2+(b-e)^2+(c-f)^2+sf)^1
.5
1040 ax=(d-a)/rad
1050 ay=(e-b)/rad
1060 az=(f-c)/rad
1070 o=n*ax+o
1080 p=n*ay+p
1090 q=n*az+q
1100 r=r-m*ax
1110 s=s-m*ay
1120 t=t-m*az
1130 a=a+o
1140 b=b+p
1150 c=c+q
1160 d=d+r
1170 e=e+s
1180 f=f+t
1190 T%=T%+1
1200 PROCplotgalaxies
1210 key%=INKEY(5)
1220 IF key%=80 OR T%=stop% PROCwait
1230 IF key%=73 PROCiterate
1240 IF key%=71 PROCsdump: key%=INKEY(5)
1250 IF key%=83 phase%=1
1260 IF key%=69 phase%=3
1270 UNTIL phase%<>2
1280 ENDPROC
1290 :

```

```

1300 DEF PROCplotgalaxies
1310 PRINT TAB(31,4)a TAB(65,4)d TAB(31
,5)b TAB(65,5)e TAB(31,6)c TAB(65,6)f
1320 PRINT TAB(31,7)o TAB(65,7)r TAB(31
,8)p TAB(65,8)s TAB(31,9)q TAB(65,9)t
1330 PRINT TAB(75,11);T%
1340 VDU 28,0,31,79,12,12,26
1350 MOVE 640,0: DRAW 640,640
1360 MOVE 0,640: DRAW 1279,640
1370 g=(m*a+n*d)/(m+n)
1380 h=(m*b+n*e)/(m+n)
1390 i=(m*c+n*f)/(m+n)
1400 :
1410 VDU 26,24,0;0;640;640;
1420 PROCc((a-g)*4.267+320,(h-b)*4.267+
320)
1430 PROCd((d-g)*4.267+320,(h-e)*4.267+
320)
1440 VDU 26,24,640;0;1279;640;
1450 PROCc((a-g)*4.267+960,(i-c)*4.267*
mz%+320)
1460 PROCd((d-g)*4.267+960,(i-f)*4.267*
mz%+320)
1470 FOR I%=0 TO stars%-1
1480 VDU 26,24,0;0;640;640;: PLOT 69,(x(
I%)-g)*4.267+320,(h-y(I%))*4.267+320
1490 VDU 26,24,640;0;1279;640;: PLOT 69,
(x(I%)-g)*4.267+960,(i-z(I%))*mz%*4.267+
320
1500 NEXT
1510 ENDPROC
1520 :
1530 DEF PROCc(A%,B%)
1540 LOCAL I%,a,b
1550 PLOT 69,A%,B%
1560 FOR I%=0 TO 3
1570 a=galc%*COS(PI/8*I%)
1580 b=galc%*SIN(PI/8*I%)
1590 PLOT 69,A%+a*2,B%+b*2: PLOT 69,A%-b
*2,B%+a*2
1600 PLOT 69,A%-a*2,B%-b*2: PLOT 69,A%+b
*2,B%-a*2
1610 PLOT 69,A%+a,B%+b: PLOT 69,A%-b,B%+
a
1620 PLOT 69,A%-a,B%-b: PLOT 69,A%+b,B%-a
1630 NEXT
1640 ENDPROC
1650 :
1660 DEF PROCd(A%,B%)
1670 LOCAL I%,a
1680 MOVE A%+galc%,B%
1690 FOR I%=1 TO 16
1700 MOVE A%,B%
1710 a=PI*I%/8
1720 PLOT 85,A%+galc%*COS(a),B%+galc%*S
IN(a)
1730 NEXT
1740 ENDPROC
1750 :
1760 DEF PROCsdump
1770 *FX 6,0
1780 */C.SDUMP
1790 ENDPROC
1800 :
1810 DEF PROCwait
1820 PRINT TAB(68,10)"..waiting.."
1830 REPEAT
1840 key%=INKEY(5)
1850 UNTIL key%<>-1
1860 PRINT TAB(68,10)SPC(11)
1870 ENDPROC
1880 :
1890 DEF PROCiterate

```

Continued ▶

YELLOW PAGES

WORD PROCESSING

◀ Colliding Galaxies, listing 1 continued

```

1900 PRINTTAB(11,10)SPC68TAB(11,10)"Ite
rate until time = ";
1910 INPUT,stop%
1920 PROCkey
1930 ENDPROC
1940 :

```

```

1950 DEF PROCkey
1960 COLOUR 129:COLOUR 0
1970 PRINT TAB(11,10)"(P)ause (I)terat
ions (G)raphics dump (S)et up (E)xit"
1980 COLOUR 128:COLOUR 1
1990 ENDPROC

```

See Check it out, page 65

Listing 1. Text checker segment

```

REM WW+ Text checker
REM by C Robbins
REM for B/B+/M/C/E with WW+
REM (c) BAU July 1989

```

GOTO main-program

```

.select-down
VDU 31,0,Y%
PRINT " "
Y%=Y%+1
IF Y%<=N% THEN GOTO select-next
Y%=0
VDU 31,0,Y%
PRINT CHR$(93)
CURSOR TOP
ENDPROC

```

```

.select-next
VDU 31,0,Y%
CURSOR DOWN
PRINT CHR$(93)
ENDPROC

```

```

.select-up
VDU 31,0,Y%
PRINT " "
IF Y%>0 THEN GOTO select-prev
Y%=N%
VDU 31,0,Y%
PRINT CHR$(93)
CURSOR BOTTOM
CURSOR AT 0
ENDPROC

```

```

.select-prev
Y%=Y%-1
VDU 31,0,Y%
CURSOR UP
PRINT CHR$(93)
ENDPROC

```

```

.yes-no
REPEAT
R%=GET
IF R%>89 THEN R%=R%-32
A%=CHR$(R%)
UNTIL A%="Y" OR A%="N" OR A%=R$ OR R%=
27
IF R%=27 OR R%=13 THEN A%="N"
ENDPROC

```

```

.message
VDU 31,39,24
VDU 131,157,132
PRINT M$
ENDPROC

```

```

.carry-on-check
VDU 13

```

```

PRINT "From Start/Current position ? (
S/C)"
REPEAT
R%=GET
IF R%>89 THEN R%=R%-32
A%=CHR$(R%)
UNTIL A%="S" OR A%="C" OR A%=R$
IF A%="S" THEN CURSOR TOP
ENDPROC

```

```

.same-word
VDU 7
DISPLAY
M$="Duplicate - "+W$
PROCmessage
VDU 136
PRINT "Continue Y/N ?"
Y%=10
IF EOT<>TRUE AND (C%=R$ OR ?126<2) THE
N Y%=9
IF EOT THEN CURSOR RIGHT
CURSOR LEFT LEN(W$)+1
VDU 31,?126,Y%
PROCyes-no
IF A%="N" THEN PROCexit
CURSOR RIGHT LEN(W$)+1
DISPLAY
M$="Check continuing"
PROCmessage
VDU 31,?126,11
ENDPROC

```

```

.same-character
M%=M%+1
IF M%>2 THEN GOTO same-multiple
IF W$>"a" AND W$<"h" OR W$>"k" AND W$<
"q" OR W$>"q" AND W$<"u" OR W$="z" THEN
ENDPROC
N$="Error ? - "
PROCpossible-error
ENDPROC

```

```

.same-multiple
N$="Multiple character - "
PROCpossible-error
ENDPROC

```

```

.possible-error
VDU 7
DISPLAY
M%=N$+W$
PROCmessage
VDU 136
PRINT "Continue Y/N ?"
VDU 31,?126,10
PROCyes-no
IF A%="N" THEN PROCexit
DISPLAY
M$="Check continuing"
PROCmessage

```

Continued ▶

YELLOW PAGES

WORD PROCESSING

◀ Check It Out, listing 1 continued

```

VDU 31,7126,11
ENDPROC

.space-option
PRINT
VDU 134
ENDPROC

.big-message
REPEAT
  VDU 131,141
  PRINT M$
TIMES 2
ENDPROC

.wait-ESC
VDU 26
VDU 31,39,23
VDU 131,157,132
PRINT "Press ESCAPE to continue";
REPEAT
  UNTIL GET=27
ENDPROC

.exit
*FX 229,0
*FX 138,0,27
*WORD.
ENDPROC

.get-file-name
CLOSE #0
PROCflash
VDU 7
VDU 13
PRINT "Please enter file name ";
F$=""
REPEAT
  RX=GET
  IF RX<> 13 AND RX<>27 THEN F$=F$+CHR
$(RX)
  PRINT CHR$(RX);
  UNTIL RX=13 OR RX=27
  PRINT
  IF RX=27 THEN F$=""
ENDPROC

.load-text
PROCget-file-name
IF F$="" THEN ENDPROC
F%=OPENIN(F%)
IF F%<>0 THEN GOTO load-file
PRINT
PRINT "File not found";
VDU 7
PROCwait-ESC
ENDPROC

.load-file
CLOSE #F%
SELECT TEXT
LOAD TEXT F%
ENDPROC

.save-text
PROCget-file-name
IF F$="" THEN ENDPROC
F%=OPENIN(F%)
IF F%=0 THEN GOTO save-file
CLOSE #F%
PRINT
PRINT "Overwrite old file ? Y/N";
VDU 7

```

```

PROCyes-no
IF A$="N" THEN ENDPROC

.save-file
SELECT TEXT
SAVE TEXT F$
ENDPROC

.flash
CX=3+2*R%
VDU 31,0,C%
VDU 131,157,132,136
VDU 31,20,20
ENDPROC

.setup-window
VDU 23;11,0;0;0;0
CLS
VDU 28,1,14,34,10
ENDPROC

.word-check
PROCflash
VDU 7
IF SOT=FALSE THEN PROCcarry-on-check
PROCsetup-window
M$="      Please Wait"
PROCbig-message
M$="      Running Word Checker"
PROCbig-message
P$=""
REPEAT
  W$=""
  REPEAT
    C$=GCT$
    UNTIL C$<"{" AND C$>"@" OR EOT
  REPEAT
    W$=W$+C$
    C$=GCT$
    UNTIL C$<"A" OR C$>"z" OR C$=R$
    IF W$=P$ THEN PROCsame-word
    P$=W$
  UNTIL EOT
  CLS
  VDU 7
  VDU 23;11,0;0;0;0
  VDU 28,1,14,34,10
  M$="      Word Check Complete"
  PROCbig-message
  PROCwait-ESC
ENDPROC

.spelling-search
N$="Search has found - "
PROCflash
VDU 7
VDU 13
PRINT "Select spelling from list Y/N ?
";
PROCyes-no
IF A$="N" THEN GOTO spell-user
REM Cursor off
VDU 23;11,0;0;0;0
CLS
VDU 31,0,24
VDU 131,157,132
PRINT "Cursor up/down moves pointer"
VDU 131,157,132
PRINT "RETURN chooses spelling";
VDU 30
SELECT SEGMENT L%
CURSOR TOP
N%=0
REPEAT

```

Continued ▶

YELLOW PAGES

WORD PROCESSING

◀ Check It Out, listing 1 continued

```

PRINT " "+GLT$
NZ=NZ+1
UNTIL EOT
IF NZ<=23 THEN GOTO spell-list-start
CLS
VDU 7
VDU 31,0,14
VDU 136
PRINT "Can't execute - more than 23 it
ems"
PROCwait-ESC
ENDPROC

.spell-list-start
NZ=NZ-1
CURSOR TOP
VDU 30
PRINT CHR$(93)
*FX 4,1
Y%=0
REPEAT
  A%=GET
  IF A%=139 THEN PROCselect-up
  IF A%=138 THEN PROCselect-down
UNTIL A%=13
W$=GLT$
CLS
VDU 31,0,21
GOTO spell-search-start

.spell-user
VDU 13
PRINT "Spelling to be searched for ?
";
W$=GLK$

.spell-search-start
SELECT TEXT
IF W$="" THEN GOTO spell-search-end
IF SOT=FALSE THEN PROCcarry-on-check
PROCsetup-window
M$="      Please Wait"
PROCBig-message
M$="      Running Spelling Search"
PROCBig-message

.spell-check
FIND W$
IF EOT THEN GOTO spell-search-end
PROCpossible-error
CURSOR RIGHT
GOTO spell-check

.spell-search-end
SELECT TEXT
PROCsetup-window
VDU 7
M$="      Spelling Search Complete"
PROCBig-message
PROCwait-ESC
ENDPROC

.error-check-1
PROCflash
VDU 7
IF SOT=FALSE THEN PROCcarry-on-check
PROCsetup-window
M$="      Please Wait"
PROCBig-message
M$="Running Multi Character Check"
PROCBig-message
REPEAT
  REPEAT
    W$=GCT$
    UNTIL W$<"{" AND W$>"@" OR EOT
    IF EOT THEN GOTO error-check-1-end
    Y$=W$
    REPEAT
      W$=GCT$
      IF Y$<>W$ THEN MX=1
      IF Y$=W$ THEN PROCsame-character
      Y$=W$
    UNTIL W$<"A" OR W$>"z" OR W$=R$

.error-check-1-end
UNTIL EOT
CLS
VDU 7
PROCsetup-window
M$="Multi Character Check Complete"
PROCBig-message
PROCwait-ESC
ENDPROC

.error-check-2
N$="Lower case error ? - "
PROCflash
VDU 7
IF SOT=FALSE THEN PROCcarry-on-check
PROCsetup-window
M$="      Please Wait"
PROCBig-message
M$="      Running Sentence Check"
PROCBig-message
REPEAT
  REPEAT
    W$=GCT$
    UNTIL W$="." OR W$="?" OR W$="!" OR
EOT
  REPEAT
    W$=GCT$
    UNTIL W$>="A" OR EOT
    IF W$>="a" AND W$<="z" AND EOT<>TRUE T
HEN PROCpossible-error
    UNTIL EOT
    CLS
    VDU 7
    PROCsetup-window
    M$="      Sentence Check Complete"
    PROCBig-message
    PROCwait-ESC
  ENDPROC

.main-program
R$=CHR$(13)

.program-start
SELECT TEXT
VDU 26
CLS
*FX 229,1
M$="      Wordwise Plus Text Checker"
PROCBig-message
PRINT
PRINT "      (C) C.Robbins 1988"
PROCspace-option
PRINT "1) Save text"
PROCspace-option
PRINT "2) Load text to be checked"
PROCspace-option
PRINT "3) Word check"
PROCspace-option
PRINT "4) Spelling search"
PROCspace-option
PRINT "5) Multiple characters"
PROCspace-option

```

Continued ▶

YELLOW PAGES

UTILITIES

◀ Check It Out, listing 1 continued

```
PRINT "6) Sentence check"
PROCspace-option
PRINT "ESC - return to Wordwise Plus"
PRINT
PRINT "Please enter choice ";
REPEAT
  R%=GET
  IF R%>=48 THEN R%=R%-48
```

```
UNTIL R%>0 AND R%<7 OR R%=27
IF R%=27 THEN PROCexit
IF R%=6 THEN PROCerror-check-2
IF R%=5 THEN PROCerror-check-1
IF R%=4 THEN PROCspelling-search
IF R%=3 THEN PROCword-check
IF R%=2 THEN PROCload-text
IF R%=1 THEN PROCsave-text
GOTO program-start
```

See Get The Fax, page 72

Listing 1. Fax page designer

```
10 REM FaxForm
20 REM by Michael Geller
30 REM B+/M/C/A
40 REM (c) BAU July 1989
50 :
60 MODE 128
70 VDU 23,8202;0;0;0;
80 DIM page% &501
90 page%=page%+1
100 VDU 19,0,7;0;19,1,0;0;
110 VDU 23,2,221,119,221,119,221,119,2
21,119
120 *TV 0,1
130 *FX 4,1
140 *FX 12,3
150 *FX 225,225
160 VDU 23,224,0,0,0,0,126,255,255,126
170 VDU 23,225,0,0,0,255,0,0,0,0
180 VDU 23,226,24,24,24,24,24,24,24,24
190 VDU 23,227,24,24,24,255,24,24,24,2
4
200 VDU 23,228,0,0,0,153,0,0,0,0
210 VDU 23,229,0,24,0,24,0,24,0,24
220 VDU 23,230,0,24,0,153,0,24,0,24
230 VDU 23,231,0,24,0,255,0,24,0,24
240 VDU 23,232,24,24,24,153,24,24,24,2
4
250 PROCdotable
260 :
270 REPEAT
280 PROCclear
290 quit%=FALSE
300 PROCgetformat
310 FOR I%=page% TO page%+&4FC STEP 4
320 !I%=&20202020
330 NEXT
340 PROCclear
350 IF horiz% THEN PROChpage
360 IF vert% THEN PROCvpage
370 IF quit% THEN GOTO 490
380 REPEAT
390 choice%=FNmenu
400 IF choice%=1 THEN PROChorizline(22
5)
410 IF choice%=2 THEN PROChorizline(22
8)
420 IF choice%=3 THEN PROCvertline(226
)
430 IF choice%=4 THEN PROCvertline(229
)
440 IF choice%=5 THEN PROCtext
450 IF choice%=6 THEN PROCload
460 IF choice%=7 THEN PROCprint
470 IF choice%=8 THEN PROCsave
480 UNTIL choice%=9
490 UNTIL quit%
500 VDU 26,20,12
510 END
```

```
520 :
530 DEF PROCgetformat
540 LOCAL key$
550 inv%=TRUE
560 PROCoutline("F a x - f o r m",32.5
,5)
570 PROCoutline("_____",32.5
,5.5)
580 inv%=FALSE
590 PROCbox(30,15,50,10,1,0)
600 PROCoutline("WHICH FORMAT ?",33,11
)
610 COLOUR 1
620 PRINT TAB(2,2)"H - Horizontal"
630 PRINT TAB(2,3)"V - Vertical"
640 PRINT TAB(2,4)"Q - Quit";
650 REPEAT
660 key%=GET$
670 UNTIL INSTR("HhVvQq",key%)
680 IF key%="h" OR key%="H" THEN PROCh
orizvars
690 IF key%="v" OR key%="V" THEN PROCv
ertvars
700 IF key%="q" OR key%="Q" THEN PROCq
uitvars
710 IF NOT quit% THEN ?(page%-1)=ASCke
y% AND &DF
720 ENDPROC
730 :
740 DEF PROChorizvars
750 horiz%=TRUE
760 vert%=FALSE
770 width%=72
780 height%=16
790 ENDPROC
800 :
810 DEF PROCvertvars
820 vert%=TRUE
830 horiz%=FALSE
840 width%=36
850 height%=32
860 ENDPROC
870 :
880 DEF PROCquitvars
890 horiz%=FALSE
900 vert%=FALSE
910 quit%=TRUE
920 ENDPROC
930 :
940 DEF PROCbox(left,down,right,up,fco
l,bcol)
950 VDU 24,left*16-4;(31-down)*32-16;(
right+1)*16-4;(32-up)*32;
960 GCOL 0,129
970 CLG
980 VDU 24,left*16-2;(31-down)*32-12;(
right+1)*16-6;(32-up)*32-4;
990 GCOL 0,128
```

Continued ▶

UTILITIES

◀ Get The Fax, listing 1 continued

[illegible]

```

1600 DEF PROCpwindow
1610 IF vert% THEN VDU2B,4,31,40,0 ELSE
VDU2B,4,17,76,2
1620 ENDPROC
1640 DEF FNmenu
1650 LOCAL key%
1660 PROCbox(45,30,70,19,1,0)
1670 PROCoutline("MENU",56,20)
1680 COLOUR 1
1690 PRINT TAB(1,2);"1. Horizontal line
s"
1700 PRINT TAB(1,3);"2. Dotted horiz. l
ines"
1710 PRINT TAB(1,4);"3. Vertical lines"
1720 PRINT TAB(1,5);"4. Dotted vert. li
nes"
1730 PRINT TAB(1,6);"5. Text"
1740 PRINT TAB(1,7);"6. Load page"
1750 PRINT TAB(1,8);"7. Print page"
1760 PRINT TAB(1,9);"8. Save page"
1770 PRINT TAB(1,10);"9. Quit";
1780 REPEAT key%=GET-48
1790 UNTIL key%>0 AND key%<10
1800 =key%
1820 DEF PROCoutline(text$,X,Y)
1830 LOCAL X%,Y%
1840 VDU 5
1850 GCOL 0,1+inv%
1860 GCOL 0,128-inv%
1870 X%=(X*16)
1880 Y%=1019-(Y*32)
1890 MOVE X%-2,Y%
1900 PRINT text$
1910 MOVE X%+2,Y%
1920 PRINT text$
1930 MOVE X%,Y%+4
1940 PRINT text$
1950 MOVE X%,Y%-4
1960 PRINT text$
1970 GCOL 0,0-inv%
1980 GCOL 0,129+inv%
1990 MOVE X%,Y%
2000 PRINT text$
2010 VDU 4
2020 ENDPROC
2040 DEF PROCmwindow
2050 VDU 28,46,30,69,20
2060 ENDPROC
2080 DEF PROCtext
2090 LOCAL key%,xpos%,ypos%,delete%
2100 PROCmwindow
2110 CLS
2120 PROCoutline("TEXT",56,20)
2130 PRINT TAB(1,2)"Use the cursor keys
to"
2140 PRINT TAB(1,3)"move, TAB to end."
2150 PROCpwindow
2160 REPEAT
2170 IF delete% THEN PROCdelete
2180 PRINT TAB(xpos%,ypos%);
2190 key%=GET
2200 IF key%>31 AND key%<127 THEN PROCa
lphchar(key%)
2210 IF key%>224 AND key%<233 THEN PROC
graphchar(key%)
2220 IF key%=13 THEN xpos%=0:ypos%=ypos
%+1
2230 IF key%=136 THEN xpos%=xpos%-1
2240 IF key%=137 THEN xpos%=xpos%+1
2250 IF key%=138 THEN ypos%=ypos%+1
2260 IF key%=139 THEN ypos%=ypos%-1
2270 IF xpos%=width% THEN xpos%=0:ypos%
=ypos%+1
2280 IF ypos%=height% THEN ypos%=0

```

Continued ►

YELLOW PAGES

UTILITIES

◀ Got The Fax, listing 1 continued

```

2290 IF key%=127 THEN xpos%=xpos%-1:del
ete%=TRUE
2300 IF xpos%<0 THEN xpos%=width%-1:yp
os%=ypos%-1
2310 IF ypos%<0 THEN ypos%=height%-1
2320 UNTIL key%=9
2330 ENDPROC
2340 :
2350 DEF PROCdelete
2360 PRINT TAB(xpos%,ypos%) " ";
2370 PROCstore(xpos%,ypos%,32)
2380 delete%=FALSE
2390 ENDPROC
2400 :
2410 DEF PROCalphachar(key%)
2420 VDU key%
2430 PROCstore(xpos%,ypos%,key%)
2440 xpos%=xpos%+1
2450 ENDPROC
2460 :
2470 DEF PROCgraphchar(key%)
2480 VDU key%
2490 PROCstore(xpos%,ypos%,32)
2500 PROCstore(xpos%,ypos%,key%)
2510 xpos%=xpos%+1
2520 ENDPROC
2530 :
2540 DEF PROCstore(x,y,char%)
2550 LOCAL temp%
2560 temp%=FNretrieve(x,y)
2570 IF temp%>224 AND char%>224 THEN ch
ar%=lcp(char%-225,temp%-225)
2580 ?(page%+x+y*width%)=char%
2590 ENDPROC
2600 :
2610 DEF FNretrieve(x,y)=?(page%+x+y*wi
dth%)
2620 :
2630 DEF PROCdisplay
2640 LOCAL P%,R%,temp%
2650 PROCpwindow
2660 P%=page%-1
2670 FOR R%=0 TO height%-1
2680 P%=P%+width%
2690 temp%=CHR$(P%)
2700 ?P%=13
2710 PRINT TAB(0,R%)$(P%-width%+1);temp
%
2720 ?P%=ASCtemp%
2730 NEXT
2740 ENDPROC
2750 :
2760 DEF PROCsave
2770 LOCAL file$
2780 CLS
2790 PROCoutline("SAVE PAGE",53.5,20)
2800 PRINT TAB(1,2)"Filename: (RETURN t
o"
2810 INPUT TAB(1,3)"quit) "file$
2820 IF file$="" THEN ENDPROC
2830 OSCLI"*SAVE "+file$+" "+STR$(page
%-1)+" "+STR$(page%+500)
2840 ENDPROC
2850 :
2860 DEF PROCload
2870 LOCAL file$,key$,ch%
2880 CLS
2890 PROCoutline("LOAD PAGE",53.5,20)
2900 PRINT TAB(1,2)"Filename: (RETURN t
o"
2910 INPUT TAB(1,3)"quit) "file$
2920 IF file$="" THEN ENDPROC
2930 ch%=OPENIN(file$)
2940 CLOSE#ch%
2950 IF ch%=0 THEN ENDPROC
2960 OSCLI"*LOAD "+file$+" "+STR$(page
%-1)
2970 PROCclear
2980 key%=CHR$(page%-1)
2990 IF key%="H" PROC horizvars
3000 IF key%="V" PROC vertvars
3010 IF vert% THEN PROCvpage
3020 IF horiz% THEN PROC hpage
3030 PROCdisplay
3040 ENDPROC
3050 :
3060 DEF PROC horizline(char%)
3070 LOCAL key%,temp%,xpos%,ypos%,oxpos
%,X%
3080 CLS
3090 IF char%=225 THEN PROCoutline("HOR
IZONTAL LINES",49,20)
3100 IF char%=228 THEN PROCoutline("DOT
TED HORIZ. LINES",48,20)
3110 PRINT TAB(1,2)"Use cursor keys to"
3120 PRINT TAB(1,3)"position first poin
t"
3130 PRINT TAB(1,4)"(TAB to fix)."
3140 PROCpwindow
3150 REPEAT
3160 temp%=FNretrieve(xpos%,ypos%)
3170 PRINT TAB(xpos%,ypos%);CHR$(char%+
2);
3180 key%=GET
3190 PRINT TAB(xpos%,ypos%);CHR$(temp%);
3200 IF key%=136 THEN xpos%=xpos%-1
3210 IF key%=137 THEN xpos%=xpos%+1
3220 IF key%=138 THEN ypos%=ypos%+1
3230 IF key%=139 THEN ypos%=ypos%-1
3240 IF xpos%<0 THEN xpos%=width%-1
3250 IF xpos%=width% THEN xpos%=0
3260 IF ypos%<0 THEN ypos%=height%-1
3270 IF ypos%=height% THEN ypos%=0
3280 UNTIL key%=9
3290 PRINT TAB(xpos%,ypos%);CHR$(char%+
2);
3300 PROCstore(xpos%,ypos%,char%)
3310 oxpos%=xpos%
3320 PROCmwindow
3330 PRINTTAB(10,3);"second point"
3340 PROCpwindow
3350 REPEAT
3360 temp%=FNretrieve(xpos%,ypos%)
3370 PRINT TAB(xpos%,ypos%);CHR$(char%+
2);
3380 key%=GET
3390 PRINT TAB(xpos%,ypos%);CHR$(temp%);
3400 IF key%=136 THEN xpos%=xpos%-1
3410 IF key%=137 THEN xpos%=xpos%+1
3420 IF xpos%<0 THEN xpos%=width%-1
3430 IF xpos%=width% THEN xpos%=0
3440 UNTIL key%=9
3450 PRINT TAB(xpos%,ypos%);CHR$(char%+
2);
3460 FOR X%=oxpos% TO xpos% STEP SGN(xp
os%-oxpos%)-(xpos%=oxpos%)
3470 PROCstore(X%,ypos%,char%)
3480 PRINTTAB(X%,ypos%);CHR$(FNretrieve
(X%,ypos%));
3490 NEXT
3500 ENDPROC
3510 :
3520 DEF PROCvertline(char%)
3530 LOCAL key%,temp%,xpos%,ypos%,oypos
%,Y%
3540 CLS

```

Continued ▶

YELLOW PAGES

UTILITIES

◀ Get The Fax, listing 1 continued

```

3550 IF char%=226 PROCOutline("VERTICAL
LINES",50,20)
3560 IF char%=229 PROCOutline("DOTTED VE
RT. LINES",48,5,20)
3570 PRINT TAB(1,3)"position first poin
t"
3580 PRINT TAB(1,4)"(TAB to fix). "
3590 PROCpwindow
3600 REPEAT
3610 temp%=FNretrieve(xpos%,ypos%)
3620 PRINT TAB(xpos%,ypos%);CHR$(char%+
1);
3630 key%=GET
3640 PRINT TAB(xpos%,ypos%);CHR$(temp%);
3650 IF key%=136 THEN xpos%=xpos%-1
3660 IF key%=137 THEN xpos%=xpos%+1
3670 IF key%=138 THEN ypos%=ypos%+1
3680 IF key%=139 THEN ypos%=ypos%-1
3690 IF xpos%<0 THEN xpos%=width%-1
3700 IF xpos%=width% THEN xpos%=0
3710 IF ypos%<0 THEN ypos%=height%-1
3720 IF ypos%=height% THEN ypos%=0
3730 UNTIL key%=9
3740 PRINT TAB(xpos%,ypos%);CHR$(char%+
1);
3750 PROCstore(xpos%,ypos%,char%)
3760 oypos%=ypos%
3770 PROCmwindow
3780 PRINT TAB(10,3);"second point"
3790 PROCpwindow
3800 REPEAT
3810 temp%=FNretrieve(xpos%,ypos%)
3820 PRINT TAB(xpos%,ypos%);CHR$(char%+
1);
3830 key%=GET
3840 PRINT TAB(xpos%,ypos%);CHR$(temp%);
3850 IF key%=138 THEN ypos%=ypos%+1
3860 IF key%=139 THEN ypos%=ypos%-1
3870 IF ypos%<0 THEN ypos%=height%-1
3880 IF ypos%=height% THEN ypos%=0
3890 UNTIL key%=9
3900 PRINT TAB(xpos%,ypos%);CHR$(char%+
1);
3910 FOR Y% = oypos% TO ypos% STEP SGN(y
os%-oypos%)-(ypos%=oypos%)
3920 PROCstore(xpos%,Y%,char%)
3930 PRINT TAB(xpos%,Y%);CHR$(FNretriev
e(xpos%,Y%));
3940 NEXT
3950 ENDPROC
3960 :
3970 DEF PROCprint
3980 IF horiz% THEN gron%=CHR$27+"^"+CH
R$17+CHR$208+CHR$2 ELSE gron%=CHR$27+"^"
+CHR$17+CHR$104+CHR$1
3990 LOCAL C%,R%,P%,temp%,temp2%
4000 CLS
4010 PROCOutline("PRINT PAGE",53,20)
4020 PRINT TAB(1,2);"Please wait..."
4030 PROCpchars
4040 VDU 2
4050 VDU 1,27,1,77
4060 VDU 1,27,1,ASC"A",1,7
4070 VDU 1,27,1,ASC"U",1,1
4080 FOR R%=0 TO height%-1
4090 FOR C%=0 TO width%-1
4100 temp%=FNretrieve(C%,R%)
4110 IF temp%>31 AND temp%<127 THEN VDU
1,temp% ELSE VDU1,32
4120 NEXT
4130 VDU 1,27,1,ASC"A",1,0,1,13,1,27,1,
ASC"A",1,7
4140 VDU 1,27,1,ASC"<"
4150 PROCout(gron%)
4160 FOR C%=0 TO width%-1
4170 temp%=FNretrieve(C%,R%)
4180 IF temp%>224 AND temp%<233 THEN P
ROCout(pchar$(temp%-224)) ELSE PROCout(p
char$(9))
4190 NEXT
4200 VDU 1,13
4210 VDU 1,27,1,ASC"<"
4220 PROCout(gron%)
4230 IF R%=height%-1 THEN GOTO 4290
4240 FOR C%=0 TO width%-1
4250 temp%=FNretrieve(C%,R%)
4260 temp2%=FNretrieve(C%,R%+1)
4270 PROCout(FNjoiner(temp%,temp2%))
4280 NEXT
4290 VDU 1,13
4300 VDU 1,27,1,ASC"<"
4310 NEXT
4320 VDU 3
4330 ENDPROC
4340 :
4350 DEF PROCout(char%)
4360 LOCAL char%
4370 FOR char%=1 TO LEN(char%)
4380 VDU 1,ASC(MID$(char%,char%,1))
4390 NEXT
4400 ENDPROC
4410 :
4420 DEF FNjoiner(temp%,temp2%)
4430 LOCAL solid$,dotted$
4440 solid$=CHR$226+CHR$227+CHR$232
4450 dotted$=CHR$229+CHR$230+CHR$231
4460 IF INSTR(solid$,CHR$(temp%))<>0 AND
INSTR(solid$,CHR$(temp2%))<>0 THEN =pchar$
(2)
4470 IF INSTR(dotted$,CHR$(temp%))<>0 AND
INSTR(dotted$,CHR$(temp2%))<>0 THEN =pcha
r$(5)
4480 =pchar$(9)
4490 :
4500 DEF PROCclear
4510 GCOL 16,128
4520 CLG
4530 ENDPROC
4540 :
4550 DEF PROCdotable
4560 RESTORE 4660
4570 LOCAL char%,temp%
4580 DIM lkp(7,7)
4590 FOR char%=225 TO 232
4600 FOR temp%=225 TO 232
4610 READ lkp(char%-225,temp%-225)
4620 NEXT
4630 NEXT
4640 ENDPROC
4650 :
4660 DATA 225,227,227,225,231,231,231,2
27
4670 DATA 227,226,227,232,226,232,227,2
32
4680 DATA 227,227,227,227,227,227,227,2
27
4690 DATA 228,232,232,228,230,230,230,2
32
4700 DATA 231,229,231,230,229,230,231,2
30
4710 DATA 230,230,230,230,230,230,230,2
30
4720 DATA 231,231,231,231,231,231,231,2
31
4730 DATA 232,232,232,232,232,232,232,2
32

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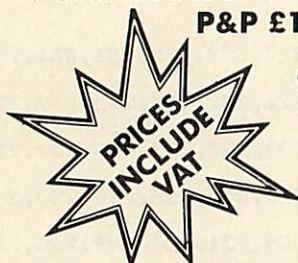
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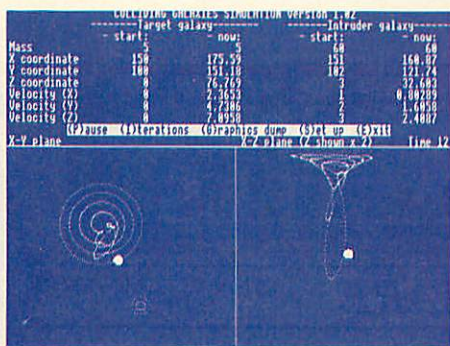
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THIS MONTH'S LISTINGS

This month's cover feature lets you put on your Creator-of-the-Universe hat and see what happens when galaxies collide!

If your printer's standard NLQ fonts are dull and uninteresting, then have a look at Hints and Tips. Included this month are programs to convert and download new fonts. For the hackers among you, there is also a suite of programs to pass parameters to Basic programs.

For the Archimedes' owner, Agora



features a handy number formatting routine and a couple of graphics demos, one to demonstrate the speed of the machine and the other to keep you amused.

If you have trouble with grammar and spelling then why not try out our *Wordwise Plus* utility!

Finally, how to organise your personal organiser and print out your own customised pages — how did you ever do without it?

Sky watching

GAMES DISC

Ten of the best *Acorn User* games on one 80-track double-sided 5.25-inch disc.

Whether you're into arcade or adventure type games this new disc has something for everyone. The games included are *Warlord*, *Wizalon*, *Castle of Nightmares*, *Run Silent*, *Run Deep*, *Polyominoes* and *Quadline*. We have also included three of the most popular one-line games from recent *Abusers*. Test your knowledge with *Mastermind* and start

playing *Varpon* and *Lurch* to win.

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'88 COMPILATION DISC

BBC Acorn User is pleased to announce the arrival of the 1988 Compilation disc.

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Included on the 5.25in and the Compact and Electron disc is: *Wizalon* — our popular bouncing wizards game; *AutoROM*, a program that allows the storage of machine utilities in Sideways RAM; *Micro Sherlock*, the game of artificial intelligence for the BBC; Joe's introduction to spreadsheets and the graph plotter to help plot out the



results; Bezier curves — fancy mathematical graphical curves; Microspacing and justifying for the improvement of your *View* printouts; *Polyominoes*, the fun block-fitting game; design your own adventures with *Imagen* plus much more. The disc also has the best from last year's Graphics Bonuses.

A detailed list of the contents of the 1988 Compilation disc for the Arc and A3000 will be announced next month.

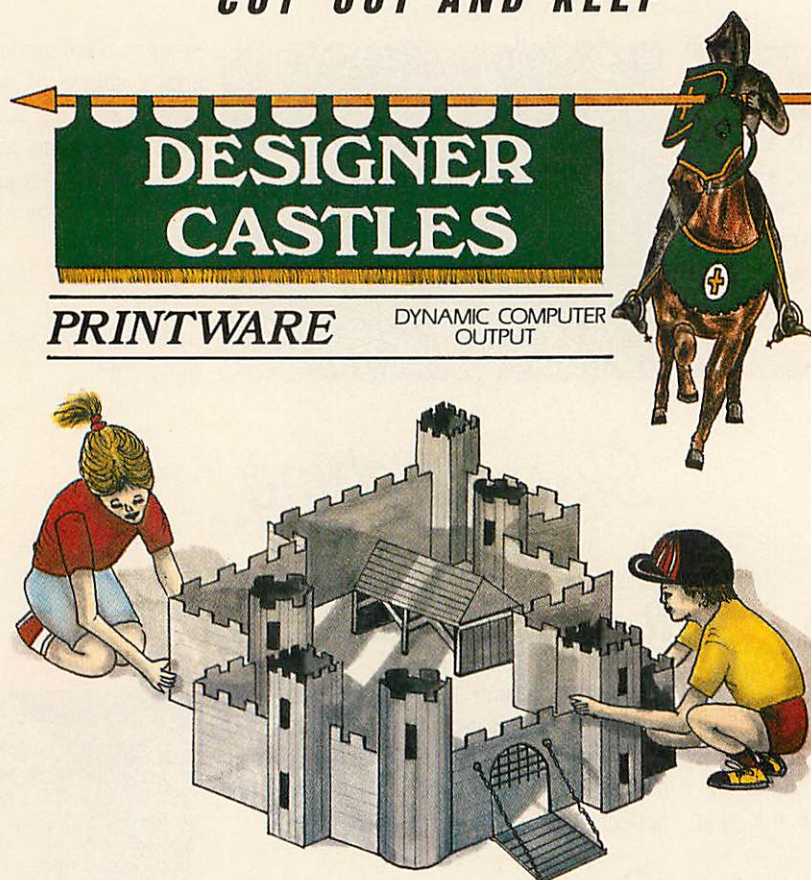
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When you are sure you're satisfied with your design, simply switch on your Epson-compatible printer then sit back and watch while it produces your plan — and every component necessary to construct your model. Now all that's left to do is to cut out the pieces then fold and glue everything together. The software even puts glue tabs in all the right places and provides strengtheners to ensure a sturdy and usable model. When you tire of your castle simply screw it up and design another — as many as you like.

The *Designer Castles* package contains a Printware support ROM, the *Designer Castles* system disc (two discs for 40-track users), comprehensive User Guide/Manual and a hardbacked full colour binder.

Designer Castles is supplied for the BBC B/B+, Master 128 and Master Compact. It requires an Epson compatible printer of quad density graphics. We feel that *Designer Castles* is the perfect addition to all our reader's software libraries. 'It is providing a design and discovery environment, the like of which has not been seen on a BBC micro ...', *BBC Acorn User*, March '89.

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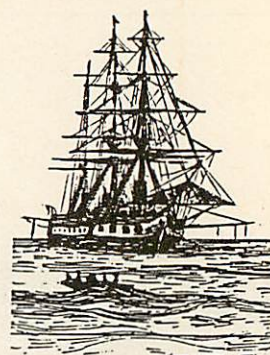
Archimedes Quest is fully compatible with existing Quest datafiles. It can import and export data in both CSV and TSV formats allowing interchange with packages such as *Pipedream* and *1st Word Plus*. It also supports the File Interchange Format allowing data to be transferred to and from other machines such as the RM Nimbus.

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H A R D W A R E

GETTING THE PICTURE

Dave Acton puts Computer Concept's new Scan-Light image scanner through its paces

In addition to the much-publicised (and yet to appear) Fax Card, Computer Concepts has now released the hand-held image scanner as a product in its own right. The package consists of the scanner itself, a podule expansion card that sits in the back of your Arc and a disc of sprite examples.

The software that drives the scanner is contained entirely on the podule card, which saves a lot of messing about.

It's difficult to see who the product is aimed at but as a means of getting pictures off paper and into your Arc, I imagine the market is potentially quite large. Desktop publishing and painting packages can all benefit greatly from the use of such a device. So how does this particular scanner stand up to scrutiny?

The hardware

The scanner is a pleasantly neat little box from Mitsubishi. It runs along on rollers, illuminating the page with a row of red LEDs underneath and has a button on the side to depress when scanning. All in all this is a seriously nice piece of machinery.

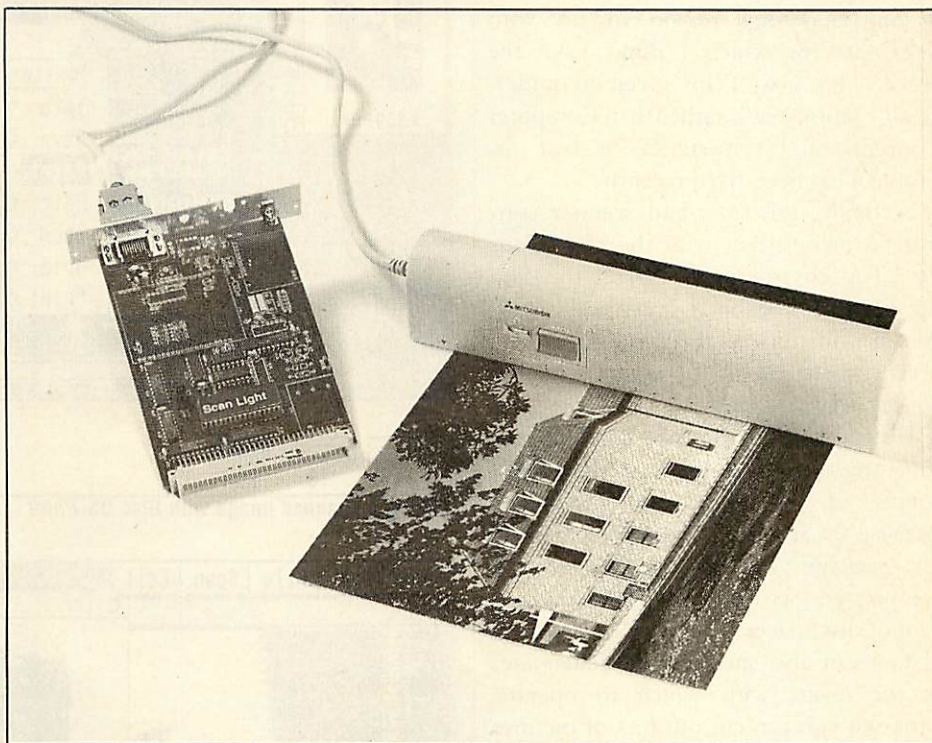
The movement of the rollers is noted so that if you scan at an uneven speed the software will know about it and compensate accordingly.

The only other control on the device is a contrast wheel to adjust the brightness of the image received – vitally important when it comes to scanning text.

The software

To be fair, I shall split the software into two parts – the low-level stuff that talks to the scanner and the 'front-end' software responsible for loading and saving, image manipulation, printing and so on.

At the low-level end I'm again glad to say that I can find little fault. The quality of the images produced (after a few minutes practice) is really much higher than I would have expected.



Scan-Light: seriously nice machinery

At the high-level end it's sadly a different story. I must admit I didn't expect much to start with. The software that goes with add-ons like this is rarely up to much. As you would expect, the current image is shown within a window as a mode 0 sprite. You can 'pan around' at leisure and, if required, another window can be opened showing a 16 grey-shade version of the scanned picture. In general, pictures are treated as 16-shade images and text as two-shade, although this is entirely up to you.

The picture-editing facilities included are very primitive to say the least. A pixel editor is just about all you're given and even this is of no real practical use. My advice has to be to invest in Risc OS and transfer your scanned images to the Risc OS *Paint* application.

This brings me on to a general point about add-ons like the scanner. I can appreciate that manufacturers face a dilemma when it comes to supplying

software with their products. On the one hand there is no point in supplying much in the way of image-processing facilities when people are just going to export the pictures to their own favourite packages anyway. On the other, manufacturers can't assume the punters have anything in the way of painting software and so feel obliged to provide the minimum in the way of editing facilities.

The result, perhaps inevitably, is a limited and largely useless collection of tools as is supplied with Scan-Light.

Printing is another illustration of this point. I did try printing out an image on my Epson 24-pin but gave up when 'Address exception' errors started appearing. I might have been doing something wrong but it doesn't really matter anyway! Risc OS printing facilities produce excellent results on dot-matrix printers, so I just saved my images as sprites, went into the DeskTop, installed the dot-matrix printer driver and dragged

REVIEWS

H A R D W A R E

my sprite file onto the appropriate icon.

In describing this method I have also revealed that I didn't use Scan-Light from within the DeskTop. The reasons are two-fold.

First, problems have occurred with scanning from within the Risc OS DeskTop environment because, well, it's a long and dull reason to do with interrupts for which I don't have the space. This was, I am given to understand, Acorn's fault rather than Computer Concepts' and rumour has it that the problem has been fixed recently.

Secondly, the front-end scanner software is inconsistent with the rest of the DeskTop environment. Again, this is a bit disappointing but I don't really care! All that matters is that you can get a decent sprite out of the scanner and do with it what you like.

However, it's not fair to condemn the software outright without mentioning a couple of the more useful features. Because the scanner is from the complete Fax package you can save images in a compressed 'fax file' form. This can save a lot of disc space.

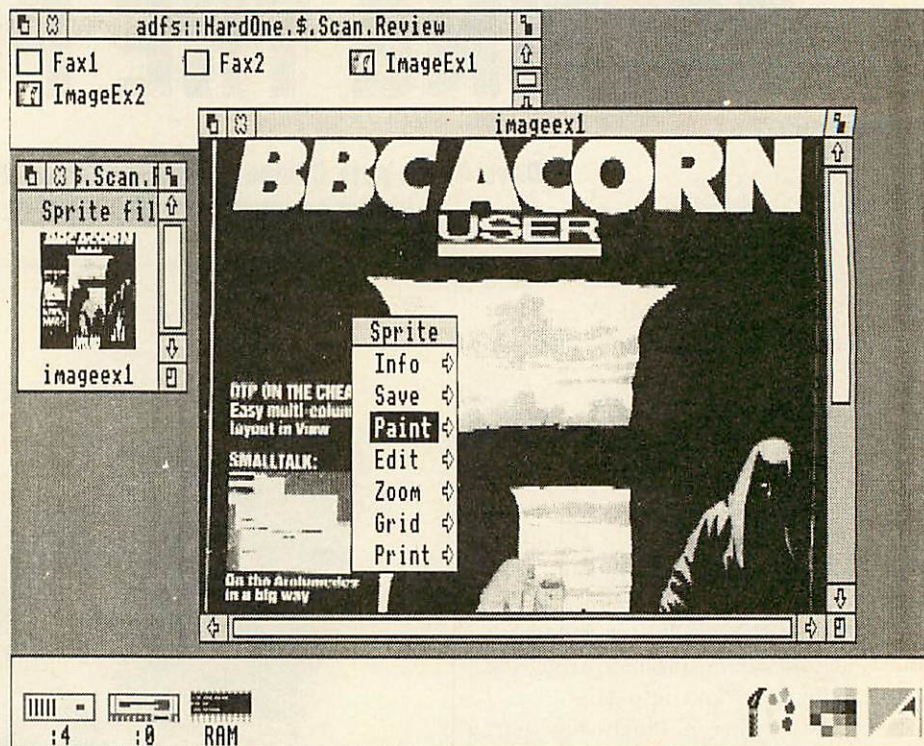
You can also specify a particular area of the image with which to operate, although you can cut out bits of pictures very easily using Risc OS *Paint* and this has to be a better approach. The manual, by the way (barring spelling mistakes) is very good.

Overall

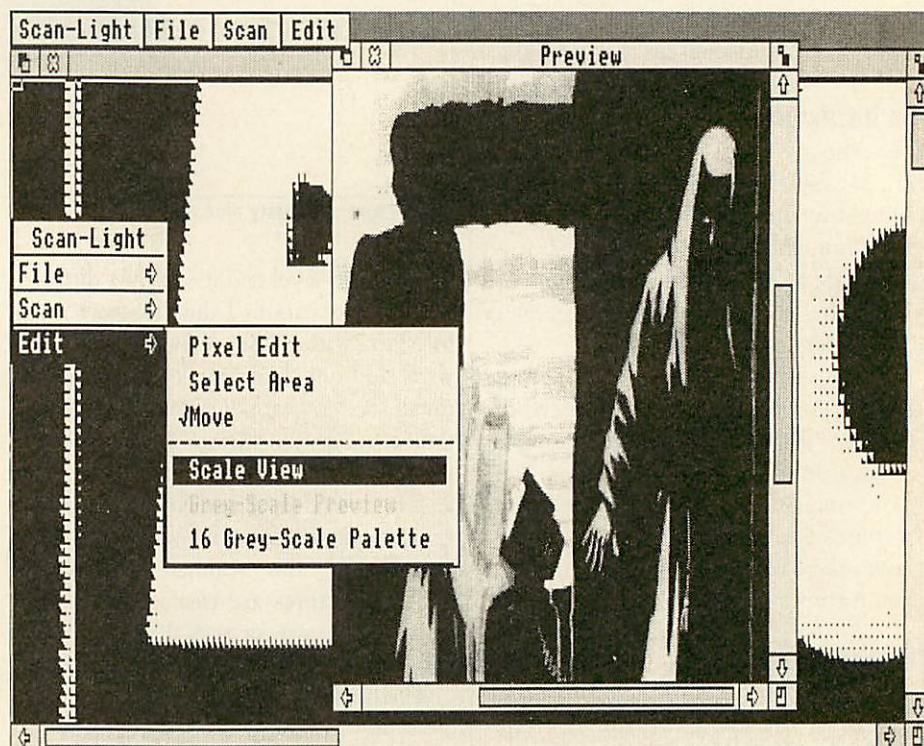
To summarize, Computer Concepts has produced a high-quality image-grabbing facility for the Archimedes made up of good hardware and fairly lousy but quite adequate software.

To complete the picture, consider the price tag of £516. This is, to say the least, a bit steep. I wouldn't rate the software as having any great value in itself, so I think this price has to be regarded as the cost of the hardware with the software thrown in free. Scanners alone can be bought for very much less and so, even with the cost of podule development taken into the sums, 'expensive' is a word which must be applied in conclusion. So, should you buy it?

There is no doubt that pictures grabbed by Scan-Light are of surprisingly high-quality. It does its basic job very



Editing a scanned image with Risc OS *Paint*



Edit menu and a 16 Grey-Scale preview

well indeed. In conjunction with Risc OS, it becomes a sensible addition to any Arc system – particularly in the area of DTP. But the cost may well be too high for many pockets.

If you are lucky enough to have the money and want a good way of grabbing

pictures then you should certainly consider splashing out. If your purse-strings are more inelastic though, you should hang on to your cash.

Scan-Light £449 +VAT from Computer Concepts, Gaddesden Place, Hemel Hempstead HP2 6EX. Tel: (0442) 63933.

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REVIEWS

SOFTWARE

LIGHTEN UP

Richard Browning puts *Render Bender*, the ray tracing package from Clares, through its paces. He reckons it could be better

Only if you've recently landed from the planet Pluto, will you have missed Clares' expansive advertisements proclaiming the arrival of the first commercial ray-tracing program for the Arc, *Render Bender*.

Like the *Pro Artisan* program, the menu system of *Render Bender* is Basic-based with the speed-essential parts written in machine code. *Render Bender* is a package of two programs, the first creating the ray-traced image and the second providing the animation.

Two discs are supplied, one which contains the programs and the other some example scene command files and compressed screen images.

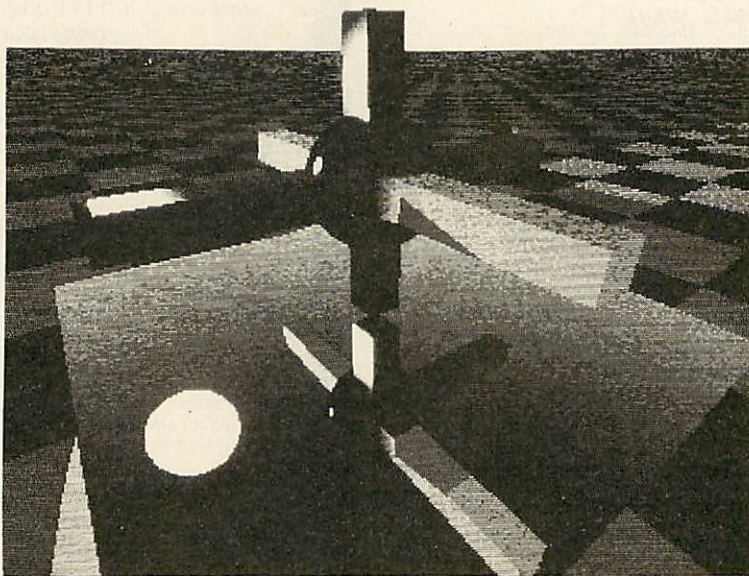
On booting the disc (no real advantage is taken of Risc OS) you are presented with an initially impressive entry screen of a spinning gold coin. After a short period, a selection screen appears from which you choose to go either to *Render Bender* ray-tracing or the *Delta Animator* animation section.

Both the initial and selection screens give good examples of what the package can achieve – unlike the packaging.

Ray tracing

Unlike packages like *Sculpt-4D* on the Amiga or *Euclid* on the Arc, *Render Bender* has no facility for placing objects on a wireframe map (with a plan view and projection view). Instead, the user positions objects using commands in a built-in line editor (which has a non-disruptive bug: keeping Insert pressed generates a substring error) accessed through the menu screen. Until a scene is described in the editor, the program will not allow tracing to occur.

Clares claims the editing approach is advantageous for those with little or no



You can build pictures with a choice of seven shapes

artistic talent but equally the opposite can be said if you do possess some flair. The non-interactive editing of the pseudo-language can be restricting.

The commands available to describe the scene allow the user to choose from seven objects (sphere, pyramid, box, disc, cone, tube, polygon) and each can have a number of specifiers which determine its colour and other characteristics (glass, shiny, mirror, opaque, metal, bulb). Specifying 'glass' makes the object transparent, 'shiny' gives it specular reflection, 'mirror' makes it reflective and 'opaque' gives it a murky appearance if necessary. 'Bulb' is useful as it makes the object white no matter what shade the rest of the environment is.

Unfortunately it is not possible to set the refractive index (which decides the angle at which light rays penetrate and move through an object) for individual objects. It is a global parameter set from the menu. In a similar fashion, the opacity of objects and also specularities are global operators.

These global parameters are severely restricting. For example, should you wish to create a hollow glass sphere (by defining a sphere of air (refractive index

= 1) inside a larger sphere of glass with a different RI), you can't. The programmer, Dave Hoskins admits that he had tried this with no success and had given up! He gave the same reason of failure for the program's inability to ray-trace inside tubes and cones. If the right equations and algorithms are followed to the letter, as Clares' advertisement stresses they are, these problems should not be encountered.

There are two further things which have to be supplied in the command text before the scene can be

traced: the position of our eyes (the observer) and the position of at least one light source. The light source can be of several different types – spotlight, point light or a parallel beam of light – with varying degrees of intensity.

You can choose to ray-trace your scene at different screen sizes, ranging from full screen down to 1/1024 size. Also, instead of tracing in high resolution (mode 15) tracing can take place in low resolution (mode 13) which speeds things up. Until you are sure the scene is exactly right, it's a good idea to trace the image in quarter size low res or sixteenth size high res. An option to draw a wireframe image would reduce development time considerably but this is not available.

From the menu, the focal length of the 'lens' through which the scene is viewed can be changed. The larger the value, the closer to the scene you get. It is also possible to bias the exposure of a scene if you have more than one light source by altering the 'lamp average'.

A scene can have one of many different floor types, ranging from wooden floorboards to circles, all scalable. The floor can also be a shiny or matt surface. The 'sky' can be any colour and the rate

of graduation from dark to light at the horizon can be altered.

Again, to speed things up, the user can toggle a parameter which determines whether shadows are generated or not.

Animation

In common with other ray tracing packages, *Render Bender* also lets you animate scenes developed not only in *Render Bender* itself but also from other sources. This is done in the other main program, *Delta Animator*.

Before you move onto *Delta Animator*, you must first generate the screens necessary to provide the animation. This is done with the command file, specifying the total number of frames (screens) required. Twenty-six variables (VA to VZ) applied to the various parameters describing the objects in the scene, to alter the positioning and characteristics of those objects in successive frames. Mathematical operators can also be evaluated, for example $(320 * \sin(\text{RAD}(VA)))$. So you can produce a table performing mid-air loops! Your imagination and the memory available on your Arc are the only constraints.

When you are sure the objects will animate as required, it's time to begin ray-tracing. The user can display the scenes as they are generated and even specify at which frame to begin and end.

As each frame has to be traced individually the process can take a very, very long time! A supplied example animation, quarter screen size in high resolution, took about 12 hours to complete. It's a case of leaving the computer on overnight and waking up to find that you made a constant too large, the disc filled up after just one 25-minute frame, or the computer crashed because of a power surge.

Unless you meticulously plan your command text and predict its operation accurately, it can take an unlucky person quite a lot of trying and hair-tearing before everything fits together!

Anyway, your frames are hopefully complete. Clicking on 'Animate' in the

Render Bender menu brings you into *Delta Animator* – for my money one of the better points of the package. After specifying to *Delta Animator* which set of frames you want animated (*Render Bender* saves each frame with the name you give and automatically generates a frame number suffix), it starts to load them in. To save memory, *Delta Animator* loads

Clares' screen compression module as it is its copyright. You can, however, save the screens in Screensave format by clicking on a toggle in the *Render Bender* menu. Your animations are subject to the same restrictions, although the actual animation code can be distributed.

Conclusion

Apart from *Delta Animator* and the manual (which is clear, concise, has an index and is spiral-bound) the package gives the impression that Clares has tried to do the minimum necessary to demand the £80 price. There also seems to be a lack of consistency within Clares as to what the aims of the package are.

For example, as said earlier, a wireframe quick-draw image of the scene is vital because of the time it would save. When asked about its absence, Dave Clare pleaded memory constraints, but Dave Hoskins said he hadn't thought of it! When I asked why it wasn't possible to ray-trace hollow spheres again Dave Clare stated lack of memory but the programmer said he just couldn't program ray-tracing of that complexity. Why can't you specify the characteristics of objects individually, like their refractive index? It's either 'Not enough memory' or 'I didn't think of it'.

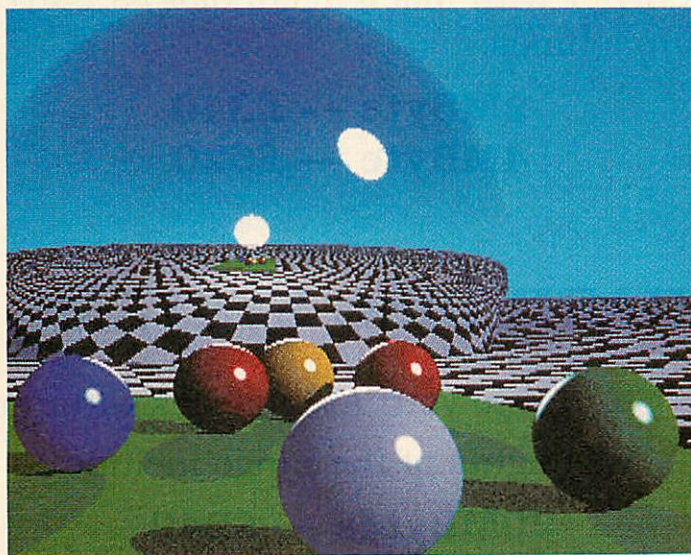
Nevertheless, what the program does do, it does well.

Ray tracing is fast (though that's really thanks to the Arc itself), although the tracing itself is done in machine code, with specially written floating point routines. The latter does

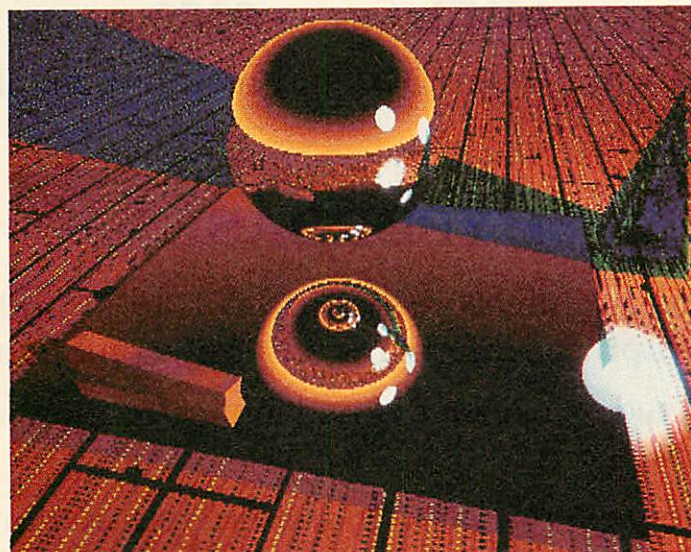
mean that Arcs with floating point co-processors are left out in the cold for the one thing they would have been a real boon for.

If you want ray tracing now, then go for *Render Bender*. Imagination has plenty of room to express itself through the package. If you can wait, my advice is to hang on to your eighty quid and see what else comes along.

Render Bender, £80 from Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA.



Delta Animator helps you animate your ray traced images



Render Bender lets you express your imagination, but it's expensive

the first frame in full and then, for each successive frame thereafter, stores only the differences from the frame which preceded it. Clever stuff. Once this process has finished you can save the compressed animation (and delete all the other frames, bar the first, to save disc space). Then, clicking on 'See Animation' allows you to do just that and pressing the left or right mouse button speeds or slows down the rate of motion.

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REVIEWS

SOFTWARE

POWER OF THE PRESS

Has BBC desktop publishing come of age? Bruce Smith investigates the rival claims of *Wapping Editor* and *Pixel Perfect*

During the early part of 1986 two software packages were creating a small storm in the Beeb world – Mirrorsoft's *Fleet Street Editor* and *PageMaker* from AMX. Both products offered the BBC user their first steps into the world of desktop publishing.

The hype surrounding the two products was quite unbelievable with modest terms such as 'revolutionary', 'phenomenal', 'outstanding' and 'professional standard' being bandied about everywhere without shame.

The reviews in *BAU* quite rightly found a number of shortcomings in the products, not least that it took a number of days for even an experienced publisher to put together anything approaching a reasonable publication.

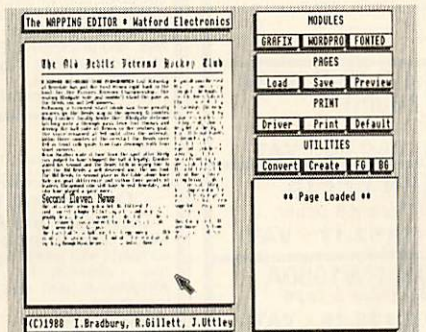
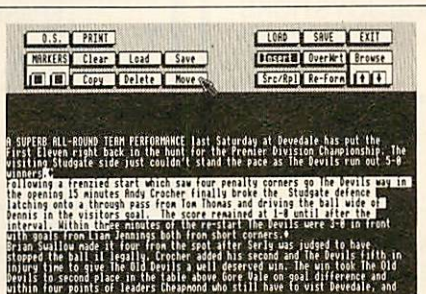
Even in its third incarnation on the PC *Fleet Street Editor* remains a poor product. Likewise so does *PageMaker* – now known as *Stop Press* – and this is the better of the two products.

Three years on there are two more DTP products available for the Beeb, which is in itself a testimony to the staying power of the computer. They are *Wapping Editor* from Watford Electronics, (the company now has the rights on *Stop Press*, interestingly enough) and *Pixel Perfect* from AVP.

Both products will run on BBC models B, B+ and Master and the table provides a useful comparison and summary of the two. *Pixel Perfect* is also available for the Electron and Compact and there is a version available for the Archimedes which is not covered here.

Wapping Editor

Watford's offering is supplied in the form of a 64K PAL Rom, a 40-track DFS format support disc (convertible to 80-track) and a useful, although sometimes illogically arranged, 100-page manual – the first four pages of which are errata. A three-button mouse is essential as the product cannot be driven from the keyboard. This is not a criticism. To my

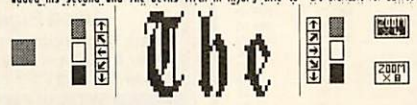


The Old Devils Veterans Hockey Club

A SUPERB ALL-ROUND TEAM PERFORMANCE last Saturday at Devedale has put the First Eleven right back in the hunt for the Premier Division Championship. The visiting Stodge side just couldn't stand the pace as the Devils run out 5-0 winners.

Following a frenzied start which saw four penalty corners go the Devils were in the opening 15 minutes Andy Crocher finally broke the Stodge defence latching onto a through pass from Tom Thomas and driving the ball wide of Dennis in the visitors goal. The score remained at 1-0 until after the interval. Within three minutes of the re-start the Devils were 3-0 in front with goals from Liam Jennings both from short corners.

Brian Swallow made it four from the spot after Serly was judged to have stopped the ball legally. Crocher added his second and the Devils fifth in injury time to



Wapping Editor: sample doesn't do it justice

mind a mouse is an essential part of any graphics software.

Wapping Editor has a modular format. The front screen doubles up as a page preview environment and the control panel contains a number of menus from which the various software components can be launched. The first of these menus is the wordprocessor which is best described as a menu/mouse driven version of the original *Wordwise* but with a distinct feel of *View*!

The wordprocessor does not offer the facilities one normally associates with such software – it is more of an up-market text editor into which you can tap in text. It does provide two markers so that

sections of text can be cut and copied as required. But it is rather slow in response and if you have either *View* or *Wordwise* installed, you're better off using those. That said, it works and does the job.

Creating a page

Before any creative work can be done, a page must be created on-disc and this is done from another of the front page menus. A number of page sizes are available, with A4 the most useful, being the listing paper standard. Once the page template is created on disc it occupies about 32K.

Page layout is performed from the graphics module and for best results all the page component files (text, graphics and so on) should be on the page disc. From here the typeface (font) can be selected along with the corresponding text file. The file is then flowed into the frame which you define at this point by positioning two cross-hairs on the screen page which is displayed with useful rules along each of the two axes. If there is too much text for the frame, it stays active and a new frame can be appended to the current one and the text will overflow into it. Once in position the text is surprisingly crisp and clear in all fonts.

The rest of the page is laid out in this fashion. Once on the page, the text becomes a 'graphic' and can only be manipulated as a 'single' object.

The main graphic menu contains all the normal graphic paraphernalia – lines, circles, ellipses and the like. Included among these is the pattern menu which provides eight shades of grey complemented by eight base patterns, any combination of which can be used.

The graphics menu itself occupies about one fifth of the screen but it may be turned on and off as required, which takes a little getting used to. It also provides access to other sub-menus such as the typesetting facilities.

A graphic cut and paste option is also provided at this point. A defined area

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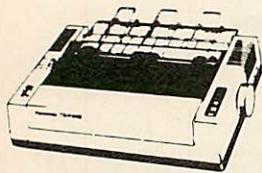
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REVIEWS

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(selected by employing a rubber-banding technique to outline it) is cut (deleted) and saved in a temporary file which may be either Ram-based (providing sufficient of the silicon stuff remains!) or disc-based. Pasting effectively reverses the process to copy the saved segment to the desired position, which is achieved by positioning the ensuing boxed outline of the item to be pasted.

An I/O menu allows mode o screens (this is the operational screen mode) to be loaded and the supporting utility disc includes a convert routine to magic other screen modes into mode o. One other facility is the ability to interface to Watford's Beeb Video Digitiser so that camera pictures can be included – a useful touch.

At any one time the graphics screen shows about half of the A4 page. The other half can be shown by scrolling up and down the page using a mouse drag technique. Once the page is complete, it can be previewed in miniature at the start screen. The large sized typefaces are discernable but body text is too small to be displayed and therefore appears as a series of dots (the technical term for this is 'greeking'). Once again this compromise is generally acceptable.

I have already touched on the subject of fonts. There are 13 styles available for use and these can be accessed either directly from the support disc or from a sideways Ram image which is supplied on the accompanying support disc. The advantage of the latter is that disc access is decreased though at the expense of a sideways Ram slot.

This might not sound too important at first glance but on a Master, for example, the software will use the Ram banks to store pages and thereby speed up the time it takes to access parts of a page quite drastically.

Printing from *Wapping Editor* takes place from the front screen and this can be performed in either draft or high quality mode. In either case an Epson compatible printer is assumed.

Pixel Perfect

This product is entirely disc-based and for the review I also had the Artpack which is essentially a disc of clip art which can be incorporated in the page. *Pixel Perfect* is supplied on two 80-track

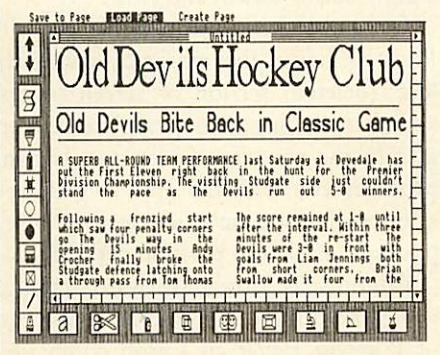
Old Devils Hockey Club

Old Devils Bite Back in Classic Game

A SUPERB ALL-ROUND TEAM PERFORMANCE last Saturday at Devedale has put the First Eleven right back in the hunt for the Premier Division Championship. The visiting Studgate side just couldn't stand the pace as the Devils run out 3-0 winners.

Following a frenzied start which saw four penalty corners go the Devils way in the opening 15 minutes Andy Crocher finally broke the Studgate defence latching onto a through pass from Tom Thomas

The score remained at 1-0 until after the interval. Within three minutes of the re-start the Devils were 2-0 in front with goals from Liam Jennings both from short corners. Brian Swallow made it four from the



Pixel Perfect: an all-in product

discs and a double-sided disc drive is needed. A 40-track version is also available. A slim, and rather inadequate 32-page manual completes the package.

I was disappointed to find that the discs were protected and there were no instructions to indicate how backup copies could be produced.

Effectively you have to work with the masters. This also means that copying them onto a hard disc – which would have a drastic increase in operational speed – was not on.

Also very annoying is that you have to run it from drive o, because if you try running it from drive 1 it looks for subsequent files on drive o.

Whereas *Wapping Editor* takes a modular but integrated approach, *Pixel Perfect* is an 'all-in' product. Text and graphics which are created within the system are produced entirely insitu.

The screen display consists of a work surface with an icon-based menu bar down the left and across the base of the screen. Icons are selected by using the cursor keys and stepping through each in turn with the selected icon reversed out. Hitting the RETURN key at the appropriate point completes the selection. There is no option to use a mouse, which is a shame, as this is a more intuitive method of operation.

The actual process for creating a document is relatively straightforward and can be performed entirely on-screen

if that is what you so wish.

Like *Wapping Editor*, the page must first be 'created'. This is done by selecting the 'create page' option from a main menu bar which straddles the top of the screen. A filename and destination drive completes the entry and the creation process starts.

This is a little tedious as the task takes two minutes to complete but since it only has to be done once per page it's livable with. It is not possible to select a page size. You are stuck with A4.

On completion the 'window' on-screen in edit mode is one-sixth of the overall page size but it is possible to preview in miniature the overall page (two if available) on-screen. However, this is accomplished via the master disc (which contains a number of utilities) after first saving and exiting *Pixel Perfect* – this is hardly satisfactory.

Only three fonts are supplied with the product though more are available in additional packs and user-definable fonts can be created. Fonts are selected at the onset before laying down any text.

The font is specified by entering a name (Roman, Gothic, or Sans Serif) and a cursor appears on screen which indicates where text will be displayed. This can be moved using the cursor keys and at this stage the height and width of the text can be set.

The manual indicates there are 625 possible combinations to choose from – more precisely there are 25 heights and 25 widths with each measurement being twice as large as the previous. An annoying feature of this process is that the text cursor can occasionally be left on the page and only subsequently removed by use of the 'rubber' to erase it.

Text can be entered directly on page and this is placed, justified, in a pre-defined frame. Copy is entered in an edit line displayed at the base of the screen which offers some rudimentary editing facilities. On completion it can be copied on to the page either horizontally or vertically.

More likely, and indeed more probably, you will want to create your text in a proper wordprocessor and like *Wapping Editor*, *Pixel Perfect* allows text files created in *View* or *Wordwise* to be imported. This text is dropped into a predefined frame and the text itself may

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be justified, centred or ranged either left or right.

Unfortunately the software does not include any filters and so any commands, rules and what have you are also brought in with it. Another huge drawback is that you can only place text from a file on the current screen. You cannot move into one of the other segments as *Wapping Editor* allows. So, if you want to produce column text you can only do so by saving your text as very small files and then lacing one after the another – quite laborious, and frankly, not practical. As with *Wapping Editor* once text is in place, it is a graphic and you cannot edit it.

A second text menu caters for direct entry of headlines and deposits the text on the page much quicker and to a predefined size. If you don't specify a font, the standard BBC font will be used and this is best for body text.

The software's error trapping is rather poor and if an error occurs when you are trying to access one of the fonts, the font file remains open and cannot be used again unless you close and reload the document.

Graphic illustrations can be created insitu using a range of drawing tools, including pen, circles (filled and hollow), inverse areas, spray, boxes, arcs and a range of pattern fills. Bear in mind that all these tools are keyboard-driven and it is distinctly more difficult to produce quality drawings than it would have been using a mouse. That said, I have no doubt that some worthwhile results can be obtained with perseverance as all the tools are provided.

Graphics screens which have a *LOAD capability – which haven't been saved in any fancy format – can be imported. As the system works in mode 0 these come in best, however, a convert utility is present on the disc which does its best to knock them into shape for use.

Again, a curious approach is taken here. First you must position the cursor on the page at the point which will be the top left hand corner of the graphic. The file must then be saved and *Pixel Perfect* left and the master disc booted up. The main menu here provides the option to merge the graphic which can then be viewed by reloading *Pixel Perfect*.

Some further useful tools are also worth pointing out. For erasure there is a

rubber which deletes all in its path. Line sizes can be set using one of 19 different pen 'nibs'. A useful tool which acts directly on a specified area of the screen is the mirror icon. Not surprisingly, this allows a mirror image of the screen to be produced in one of four planes – left to right, top to bottom, flip (which is simply upside down) and twist.

Cut and Paste is also possible. As with *Wapping Editor*, this works by saving the 'cut' (deleted) section of screen to disc and then pasting it (copying) back from disc to the new specified point. Expand provides you with the option to double one of the section's dimensions when pasting it back into position definitely.

Printing is straightforward enough using the printer icon and as in the case of *Wapping Editor* an Epson compatible printer is expected.

Conclusions

Both products are not exactly intuitive to use and if you are contemplating either one, you must expect to spend some time experimenting and generally playing with all the options before you can really get

compared to very expensive software on more powerful machines. It should also be borne in mind that DTP is primarily a graphics-based process and in today's terms graphics is not one of the Beeb's strongest points as it requires vast amounts of memory.

Of the two, *Pixel Perfect* is the harder product to learn and rather ungainly in operation. In this area *Wapping Editor* is far superior, but at a cost. *Pixel Perfect* also has a number of irritating features. For instance there is no access to the star command prompt, there is no Quit option (other than CTRL-BREAK) and when you try to do something which is perfectly legitimate (like running from drive 1) childish messages are displayed, which assume you are trying to use the product illegally.

Both products offer a 'What You See Is What You Get' display which is essential for this type of product. The final printed output is what it's all about and in this respect there is little to choose between the two. Both dump what are clearly computer-generated pages and the fonts used on screen are far superior in looks than those printed.

Both products are limited to single page designs. Multiple pages are not allowed and functions such as headers and footers are non-existent though they can be produced manually on-screen.

Wapping Editor comes supplied with a sample page on disc for examination which is not very exciting and, in itself, does not do justice to the package. No disc-based sample pages are provided with *Pixel Perfect* though some are illustrated within the manual.

However, for the home, school or club both will do a good job. Bearing in mind the limitations of the Beeb for running this type of software, both achieve reasonable results. However, only the Watford product is really driving the Beeb to its full potential in this area.

Feature	Wapping Editor	Pixel Perfect
Format Support	ROM Mouse	Disc Keyboard
Multiple Page Sizes	•	–
WYSIWYG Display	•	•
Screen preview	•	•
Wordprocessing	•	–
Import text	•	•
Import View/Wordwise	•	•
Text continuation	•	–
Graphics facilities	•	•
Import graphics screens	•	•
Screen conversion	•	•
Digitiser interface	•	–
Multiple pages	–	–
Number of fonts	13	3
Font creation	–	•
Headers/Footers	–	–
Manual	•	•
Example File	•	–
Rating (out of 10)	8	4

Comparison of the two packages' features

the best from either. This process is not helped by the non-hands-on approach of the manuals. The content of the *Pixel Perfect* manual is quite dreadful.

As a seasoned DTP user, I found both products cumbersome to use but that is

Wapping Editor £79.35 (with Quest mouse £102.35) from Watford Electronics, 250 Lower High Street, Watford WD1 2AN. Tel: (0923) 37774. *Pixel Perfect* for B, B+, Master and Electron £45.43. For Compact £47.95. Fontpacks £14.38 (Compact £16.90). Artpack £22.43 (Compact £24.95) from AVP Computing, Chepstow, Gwent NP6 5ER. Tel: (0291) 625439.

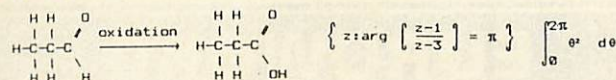
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GREEK ALPHABET: Upper and lower case, upright and italic

Α Β Γ Δ Ε Ζ Η Θ Ι Κ Λ Μ Ν Ξ Ο Π Ρ Σ Τ Υ Φ Χ Ψ Ω

SCIENTIFIC CHARACTERS: Mainly mathematical but also chemical symbols

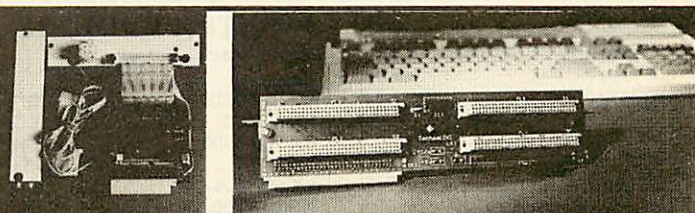


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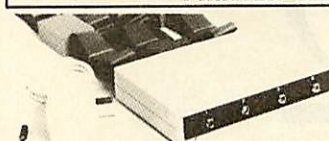
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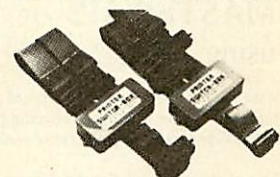


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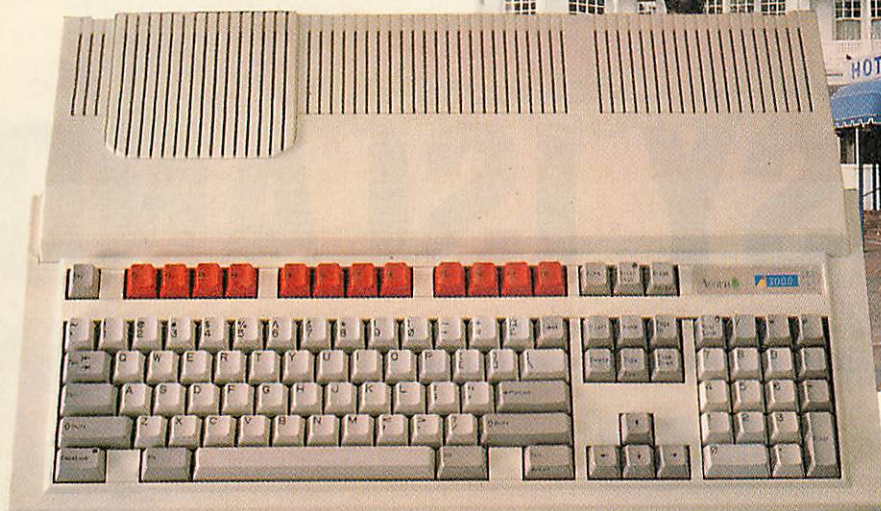


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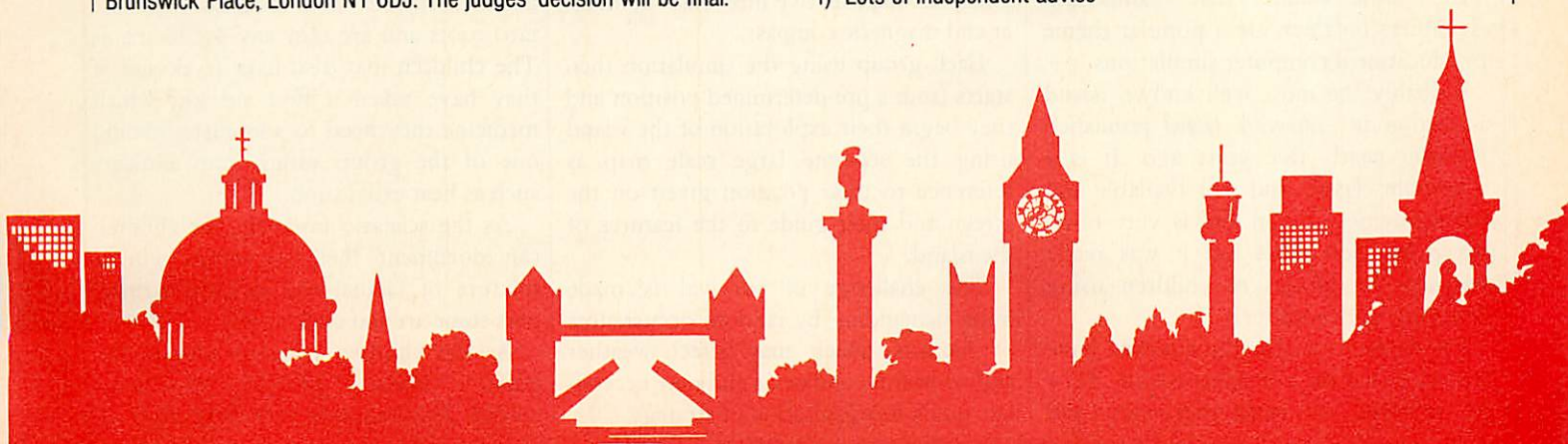
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WIN THE NEW MACHINE AND A LUXURY WEEKEND IN LONDON



FANTASY ISLAND

Ah, this is the life – or is it? Three adventures show that it's not all luxury on the island of your dreams

Dave Fletcher



In children's literature there are numerous examples of stories centred around islands. Classics like *Treasure Island*, *Robinson Crusoe*, and *Swiss Family Robinson* develop the theme of desert islands but so do a wealth of other children's literature. It is a theme in the world of adults too. Look at the success of Roy Plumley's *Desert Island Discs* or even Shirley Conran's recent novel, *Castaways*.

It is little wonder that islands and adventures on them are a popular theme for educational computer simulations.

Probably the most well known island simulation is *Adventure Island* published by Ginn nearly five years ago. It is a 'classroom classic' and still available and worth buying. It can and is very often played by individuals but it was really designed for groups of children using their skills collaboratively.

The scenario is that the children have been stranded on a tropical island. They are required to make decisions and

overcome difficulties and dangers in an attempt to survive the rigours of the fictitious island by exploring the various features in an attempt to ultimately escape or get rescued.

To start off the simulation, children write a short story describing the events that led to them being marooned on the island. Then with the program loaded for the first time they must choose five items of equipment to aid their survival from a limited list – first aid kit, nylon cord, knife, mirror, box of matches, magnifying glass, shovel, axe, five litre water container and magnetic compass.

Each group using the simulation then starts from a pre-determined position and they begin their exploration of the island using the separate large scale map as reference to their position given on the screen and their guide to the features of the island.

The challenge of survival is made more demanding by random occurrences of hazards which may affect weather and/or health conditions and may necessitate quick reorganisation of strategy.

Further interest is added by the map showing a number of unusual features and the tempting possibility of discovering long lost treasure.

Adventure Island is designed to be used as an extended activity made up of a series of sessions at the keyboard. Each one of which is meant to represent 'a day' on the island. An integral part of the project is keeping a daily diary of the group's experiences.

As well as this, the children also have to 'research' the various finds they make in their travels. For instance what are taro roots and are they any use to them? The children may also have to decide, if they have taken a first aid kit, which medicine they need to administer should one of the group suffer from ailments such as heat exhaustion.

As the scenario unravels, the children can document their adventure with a mixture of factual and creative writing plus some art and craft work.

As the children progress around the island a variety of problems have to be solved. For example they may need to

decipher a mathematical sequence or a morse code message.

There are many dangers and dilemmas to be faced. There are swamps and minefields to be negotiated and events like an attack by a wild boar on groups at particular places.

When this does occur, usually one member of a group gets injured. As ever, at least one of the children in the group will be intent on travelling on to the cave where they had planned to shelter for the night whatever the cost. But with the injured person in no state to travel and the map being consulted and some realization that the planned overnight halt was up a steep incline, it all might seem an unnecessary risk.

The only answer is for them to seek shelter immediately so the injured person can recover by morning.

The diary entries for such days, are full of vivid description of the attack of the wild boars and a report of the decisions that led to the change of plans.

Using a simulation such as *Adventure Island* is not just about pressing buttons. It is about discussion, considering options and making decisions.

The bulk of the work when using this kind of simulation is done away from the computer. Learning is not derived from merely responding to the computer's display but is the interaction of the group, the research and the joy of discovering things around the island.

The latest package from Cambridge-shire Software is *Rescue: An Island Adventure*. This has been developed with a lot of input from Ian Whittington who was behind the original *Adventure Island*.

Rescue certainly shows how programming techniques have moved on from the basic text displays of *Adventure Island*. Here the whole simulation takes place in an animated microworld.

Unlike *Adventure Island* the scenario is set. You are going on holiday to visit your Uncle. The program first shows a large motor cruiser meandering around the island coastline and coming in to land at the quay.

Surprise, surprise there is no Uncle to meet the children! The graphics are an effective beginning and set the pattern for what is to come. Armed with a map of the island the group playing *Rescue* set off to find Uncle's cottage.

Gone are the simple text displays which still plague so many educational simulations and gone too are the numbers

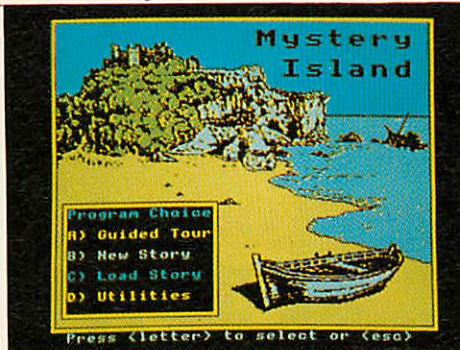
or letters to move around or to control the environment of the simulation.

Rescue replaces the 'normal' display children expect from educational packages with quality graphics and animation that in the past was only to be found in the province of the arcade game.

The main screen where the adventure takes place is made up of four parts. The major area taking up over a quarter of the screen. This is a window on the island and it is here that the children move around, explore and solve the problem of finding Uncle.

Above the window is a clear display of the co-ordinates of the square that is currently displayed so that movement can be traced on the printed map provided.

Below is a message box which names the part of the island you are



Mystery Island — a creative writing program ...



... easy to use with other packages

visiting, and right at the bottom are a set of icons that tell the time and indicate how much food and water you have left.

Rather than dials to read, there is a bottle of water whose level drops when you are thirsty and baskets of food that disappear when used.

On the left of the island display is a display of the named four faces of the children playing. These change colour and facial expression as the simulation develops depending on things like morale and energy.

Moving around the island is achieved either with the computer's cursor keys or a Concept Keyboard. As the keys or pad areas are pressed a person-like sprite moves on the map. As the edge of the window is reached the display scrolls either left, right, upwards or downwards.

Children playing *Rescue: An Island Adventure* have real hands-on control in the way that keying numbers to move never had. More importantly, the display of the island with trees, bushes, pond and streams scrolling around it makes the scene pretty lifelike.

As well as Uncle's cottage the island has a number of other special features such as a mine, chapel, the lighthouse and a shipwreck. It is in one of these places that Uncle has gone missing!

As well as searching around the scrolling map, children can go inside the places they find. It is the details inside the places that make the game so outstanding. Children really feel it is them exploring.

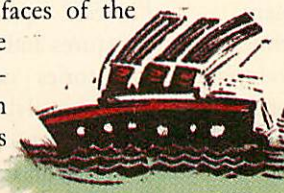
For example, when they go inside the cottage they see a kitchen, bathroom, sitting room and library. There are objects to explore like a chest which contains dry clothes of all sizes and places to get more food and water.

One interesting facet of this simulation is that in a number of places the children discover they don't go around collecting objects. For example in Uncle's cottage, when they explore the library, they are told what maps, plans, books and objects are on the shelves.

By noting which maps or objects Uncle has taken with him, they can deduce where he might have gone.

The exploration of these places is very effective. Children literally walk inside and move around. The chapel is made to seem a pretty eerie place with its stone floor and tombstones. Of course there is a trapdoor (there has to be!) that leads to a maze and at the end is some treasure.

The object of the simulation is to locate Uncle and rescue him. Like all good educational packages, Cambridge-shire Software House allows plenty of teacher control, and fortunately it is an option for the teacher or a random decision to decide where Uncle has got lost. This can be in the chapel, the mine, at the West Cliff, or on the shipwreck.



EDUCATION REVIEW

Say, for example, the teacher has chosen the mine for the location of the lost Uncle. Eventually, the children will make their way to the mine and move around inside searching by going up and down ladders and following passages. Some children will want to map everything but it is not really necessary as there are a number of objects to help you remember where you have been. The tracks of the little underground railway provide a route to follow and the wagons along the way provide markers to the way back.

It is not entirely straightforward though. One path leads to a dead end with an appropriate skeleton (not Uncle!). In the end, Uncle can be seen in the distance and with a bit of back tracking the children searching get nearer. When

he has been located in the mine, he shouts out 'I've fallen down the mine. Go to the lighthouse and get at least 20 metres of rope'. The group then goes

off to the north west corner of the island in search of the lighthouse to get the necessary rope. After searching around the lighthouse they come across a chest with some lengths of rope but there isn't one long enough to rescue Uncle and the children have to select two suitable pieces that will make more than the length required when knotted together and carry it back to the mine.

As a computer package for children *Rescue: An Island Adventure* is very well done indeed. It certainly uses the technical developments in programming sprite graphics and scrolling displays in a way that most educational software developers have not even considered.

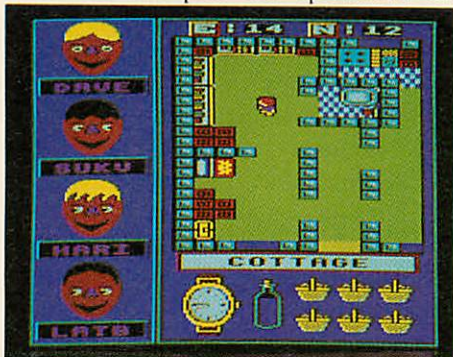
Educationally it offers so much. For a start it gives children the chance to speculate and get involved in the reasoning processes used in real life situations.

Teachers or parents who see children use it at home or in the classroom will find it generates tremendous motivation and enthusiasm and provides many opportunities for children to work together to solve a common problem.

If you are looking for a theme that is ripe for cross curricular development, Islands is one well worth considering. With computer simulations like *Adventure Island* or *Rescue: An Island Adventure*

available you and your children will have a unique opportunity. But as well as these two simulations there is another unique package.

It's called *Mystery Island* and it is the latest package from Tressel Publications, the educational software co-operative, which in the past has specialised in



Rescue: An Island Adventure ...



... where children face adversity ...



... in a quest to find their uncle

historical simulations. *Mystery Island* is a new departure for them. It is a creative writing program for 7-12 year olds that incorporates a picture editor, as well as a wordprocessor and spelling checker. It is a brilliant program to use in conjunction with other software such as *Adventure Island* or *Rescue: An Island Adventure* but it can equally be used alone, making pictures and writing stories.

Stories can begin in any of eight *Mystery Island* scenes. These include a beach, a boat out at sea, a wreck, a boat coming in to land on the island, a cave, a

castle and a wood. In addition there is one blank scene for your own designs.

One of these scenes has to be chosen for the children to begin their story.

Then by using the package's picture editor the children can add transfers to the scene, building up certain elements. These can be anywhere on the background and flipped to appear in different directions and the colours of faces and tee shirts can also be changed.

Altogether there are 50 transfers to choose from but no more than eight can be added to each scene. However, that is not a practical limitation.

The available transfers cover a good range. There are 10 boys and 10 girls in different positions such as running, jumping, walking and falling, a set of birds and animals, creatures like demons and ghosts and a range of objects including treasure chests, a barrel, a lamp and a map. The text editor offers useful wordprocessing facilities. Up to 30 lines of 40 characters each can be written to go with each picture and once a screenful of 12 lines has been completed, the display scrolls up.

Good use is made of the function keys dealing with inserting lines, justifying and centring text, copying or deleting blocks and printing. One of the function keys also calls up a rather good 22,000 spelling checker with the option for children to add 1000 words of their own. Usefully, the spell-checker can be used outside *Mystery Island* - nice bonus.

Children find *Mystery Island* just what they want to link together their ideas and thoughts through the media of both pictures and words. The program offers a new electronic means of composition. As well as viewing work on the screen by flicking through the pages it is possible to produce hard copy too. Pictures and text can be printed out with the built in screen dump for Epson compatible or Integrex and Canon printers.

When children do use *Mystery Island* almost anything can happen. What happens is for them to decide, not the teacher or the programmer!

Adventure Island is published by Ginn & Co, Prebendal House, Parson's Fee, Aylesbury, Bucks HP20 2QZ for £29.95. *Rescue: An Island Adventure* is published by Cambridgeshire Software House, The Town Hall, St Ives, Huntingdon, Cambridgeshire PE17 4AL for £18. *Mystery Island* is published by Tressell Publications, 70 Grand Parade, Brighton BN2 2JA and it costs £20.



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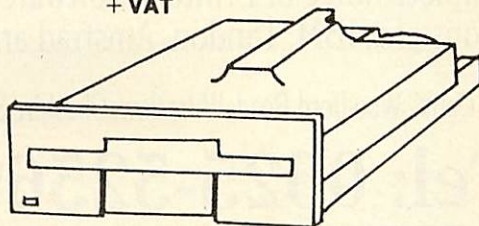
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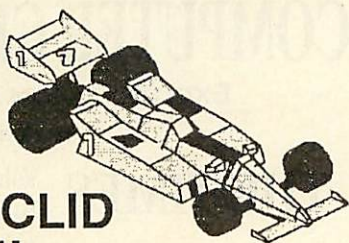
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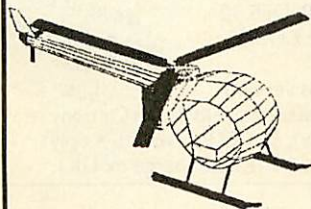
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HELP WITH HANDICAPS

I am researching the use of computers with mentally handicapped people on behalf of Sheffield Social Services. The aim is to draw up guidelines for the Mentally Handicapped Training Centres under that body's authority. My initial investigation shows that those centres which are using computers invariably possess BBC model Bs and Masters. This has caused problems which I would like to outline.

Acquisition of hardware and software has tended to be ad hoc – unformed by any clear ideas about what the centres hope to gain from its use. Disappointment, staff hostility, and even the purchase of equipment which is never used, is often the result.

Apart from the problem of 'Mental' handicap ruling out a great deal of mainstream software (be it games, educational or other), problems of motor co-ordination are common. Some software is inappropriate simply because it demands too much in the way of manual dexterity.

Very little has been written in the computer press about either available products or current thinking in this (I believe) very hungry area of microcomputer applications. Can anyone help me out?

Philip Roddis
Sheffield

We suggest these three companies and would like to hear from any others.

Ray Wood, Nordis Soft-



ware, Cornhill Close, Lodge Farm Industrial Estate, Northampton NN5 7UB. Tel. (0604) 54358. David Colven, ACE Centre, Ormerod School, Wayne-flete Rd, Headington, Oxford OX3 8DD. Tel. (0865) 63508. Richard Pourtney, MESU, Sir Williams Lyons Rd, Science Park, University of Warwick, Coventry, CV4 7AZ. Tel. (0203) 416994.

MUM KNOWS BEST

As a teacher, I have always found the educational pages of *BBC Acorn User* to be informative and accurate. However, I must write to correct a piece of 'utter rubbish', published in the May issue under the title 'School Report'.

Drage would take note, I gasp with horror at their comments that parents may be spoiling future classwork for teachers by using educational software packages at home.

It is attitudes of this type which reinforce the myth that parents ought not take respon-

sibility for their childrens education, but should leave it to the 'professionals'.

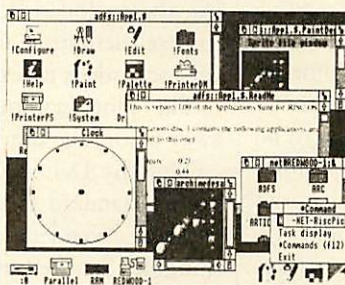
Parents do not need your discouragement. Most are more than capable and could probably show these teachers a thing or two. Well done Mums and Dads! Continue to develop your childrens interests and abilities in as many ways as you can.

John Sisson
Derby

WAITING FOR RISC OS

I have been a dedicated user of Acorn machines for nearly four years now from BBC B to Arc and only now I am very angry with Acorn on the subject of Risc Os.

Risc OS has been reviewed by many magazines over the past five months since it was first shown by Acorn. I have read most of these reviews



and they have all said how wonderful Risc OS is. Acorn has now had around four months to mass produce the product which should be enough time.

So in February, I placed an order with my Acorn dealer and waited eagerly for April to come round. But have since been told that I would

have to wait until around May.

Surely Acorn realise they have an excellent product on their hands and I would have thought that they could have got it right this time.

S Mansfield
Margate

Acorn has in fact underestimated the impact that Risc OS has made. A number of top dealers, such as Watford and Technomatics, have also expressed concern over the slow and limited delivery of the new Risc OS Roms. Commenting on the delivery problems Acorn's product manager David Bell, Acorn's product manager said, 'the problems are due to the lead time in getting Roms out of Japan, however I expect the backlog to be cleared by July.'

MASTER TOOLKIT

I am looking for a Basic Toolkit for use on the Master 128. The Beebug Toolkit would have been ideal, but it doesn't work on the Master.

P Burton
Glasgow

A number of toolkit Roms exist that are designed specially for use with the Master 128. Most have been written to add the ADFS commands such as *FORMAT, *VERIFY etc that were missing from the original MOS. MOS+ from Dabs Press has these, plus alarm functions that make use of the Master's real-time clock.

GAMES

I was about to start this with 'bad news for *Bolo* fans' until I remembered that no one has actually got the game yet. And they're not going to either, at least not under the Go-Dax label.

Martin Maynard at Go-Dax has decided to abandon the project, and all software of any sort for that matter.

So the author, Delos 'Joust' Harriman has had to start searching for someone else to market his game. So far he's been unsuccessful but he told me that there's no way he will give up easily.

The trouble is that the game requires at least three micros to show its potential, and preferably 16! This means that the most obvious customers are schools. They have the required hardware but although the combination of arcade games and school may appeal to the children, it doesn't to the balance sheet and unfortunately this is what counts. However Delos is determined, and has threatened to market the game himself if all else fails.

The fact that the game is best played on lots of computers can be thought of as a distinct advantage. Why not get some friends with computers to pool together with you to buy the game? This would drastically cut the price and make the whole thing very worthwhile.

It's sad, but many software houses, when asked, have said the Archimedes market is too small for much effort. Let's face it, the power of the Arc has yet to be exploited and it needs a good programmer with time and the promise of cash to sit down and produce something good.

So far no one has deemed the market profitable enough in this respect to invest any significant amount of money, including big companies like Superior and Grandslam who have temporarily halted Archimedes development.

I say temporarily because Acorn has produced a machine which will hopefully solve the problem. The new Archimedes A3000 to replace the 310 comes with 1Mb of memory as standard (that's double the standard capacity of the ST and Amiga!). It also features stereo



Predator; the exciting new game from Superior software, based on the well-known Schwarzenegger movie of the same name

speakers and will be self-contained in a single box about the same size as a Master – sounds a lot like a designated games machine to me!

Let's hope some games companies feel I'm correct enough to give it a second chance.

Domark, (*Star Wars, Empire Strikes Back*) has finally released the sequel, *Return of the Jedi*, despite having initially decided to omit it from the trilogy. I won't go into any detail now because you can read the review here!

Domark is also working hard to coincide business with the release of the latest James Bond film *Licence to Kill*, out in the summer. Traditionally Domark has always coded Bond's character down, to pixel definition and this latest espionage escapade is no exception.

The plot (without giving too much away before the film) is as follows:

Timothy Dalton is granted leave from boring standard missions and takes on a personal vendetta against arch-drug smuggler Sanchez and the tentacles of his dealer network. According to Domark's Clare Edgeley the computer plot closely follows that of the film.

In the game you control Bond through a helicopter chase, an underwater scene where you must dodge the sharks and Sanchez' thugs and finally in a stolen crop duster where you find yourself attempting to prevent Sanchez escaping with a massive haul of drugs hidden in a convoy of petrol tankers! Exactly how, she has yet to reveal. Amiga, ST, PC,

Amstrad and Speccy owners get their copies in June but the humble Beeb will have to wait a couple of months longer. (Keeping the best for last, huh?).

Impact is working on another BBC game, this time called *White Magic*. Steve Botterill is currently keeping as quiet as possible about it to build up some suspense – but he did mention that it was a bit like *Gauntlet* in the sense that it will be an arcade adventure with a choice of four characters.

So far I don't know whether the four, namely a leprechaun, a Titan, a warrior and an enhancer (presumably the equivalent to a wizard) can be played together or only one alone.

The game is being sold under the Fourth Dimension label, the team responsible for both the BBC and Archimedes versions of the excellent *Holed-Out!*

Superior is onto another licensing deal in an effort to fill the *BAU* back cover advert when the *Play it Again Sam* series runs out (at ten).

From Psygnosis, *Ballistix* is, as they say, a 'whole new ball game' which takes place in a futuristic football stadium. Playing against either the computer or a friend, you fire metal balls around a far from the simple stadium into the two goals. There are plenty of complications, coming in the form of magnets, tunnels, splitters, bumpers and red arrows which increase the velocity of any ball that runs over them.

The game derives from the Amiga/ST format and employs complex imagery so I find it difficult to visualise a BBC micro version without images of blocky, confused graphics clouding my thoughts. Superior has moulded itself a reputation for taking on difficult projects and *Ballistix* will certainly not be easy!

Before I finish, I would like to remind you that we still have Bubblebus' *Starquake* maps on offer for £1. Send a cheque and an SAE to The Games Page, (hopefully accompanying some cheats or high scores, but these aren't necessary) at BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ.



Return of the Jedi; Domark, BBC B, B+ cassette £9.99, Master disc £12.99.

Return of the Jedi finally completes the *Star Wars* set but frankly this is nothing to celebrate. After two very promising intergalactic games, *Jedi* is something of a letdown.

The first wave places you in the persona of Leia in the hot seat of a speeder bike. Your task is to race through the forest to the Ewok village, knocking off or shooting the pursuing Imperial Stormtroopers.

Another way to eliminate them is to lead them through a trap set by the Ewoks. The second rider through is always the unlucky one, being either crushed between logs or knocked off by a taut vine.

The viewpoint attempts to give a three dimensional view of the scene and although in this it succeeds, it makes estimating the distance between yourself and trees very tricky.

The game has been written in mode 0 which although it gives high resolution doesn't allow more than two colours and the bright yellow background can really hurt your eyes.

The Stormtroopers are pretty pathetic and the most effective deterrent is to do absolutely nothing! They come quietly up to you and give you a few nudges before hitting a tree or something.

It is too easy to avoid them and too difficult to avoid the traps - I have yet to make it accurately through a log trap without smashing into a little Ewok!

Although there are three levels of difficulty, these are virtually identical and after a few games, indistinguishable.

When the Ewok village is reached, the little bears all dance up and down in joy. However the celebrations are short lived and you soon find yourself in a Scout Walker wobbling about under the control of Chewbacca.

The idea here is much the same only this time you are leaping out of the way of logs and rocks. These come too

quickly to avoid no matter which level you happen to be on!

After the bunker is reached and blown up, releasing the protective shield surrounding the Death Star, the *Millennium Falcon* can swoop in, fly down a tube to the centre and shoot the central reactor which Darth has foolishly neglected to protect after his last Death Star was destroyed using the same method.

Return of the Jedi is obviously a rushed job and while it does hold a few nice twists I can't recommend it even if you are a dedicated George Lucas fan.

Sam Greenhill

Blood of the Mutineers; Robico Software, BBC B, B+, Electron, £14.95 (disc) £12.95 (tape).

As soon as it had finished loading, I suspected this adventure was going to be good - and prove to be nearly impossible. And I was right!

The game itself is huge and room descriptions are very good, if a little over the top - the captain's cabin manages to occupy the whole of one screen!

The parser is certainly one of the best that I have ever used, allowing multiple statement lines, the use of IT,BUT,ALL, etc and a very useful undo facility for when you find yourself in a bit of a tight spot. However, it seems you cannot undo if you have just died, which would appear to me to defeat the whole object of its existence!

The game is fairly difficult to start off and it took me a while to get into the swing of things. If anyone else is in this situation, you'll find it helps to close and lock the door!

The puzzles are taxing and I believe a player would be hard pushed to complete the game without some aid. Some puzzles are near impossible to guess at and some subtle clues left lying around would have helped.

One thing you either love or hate is messages like 'Talk straight, shipmate' or 'Please specify, matey'. I found they added to the atmosphere at the start but then became rather annoying.

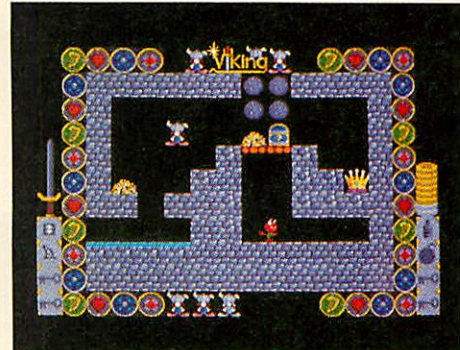
After spending several attempts to solve a problem with various permutations of a command, the message 'You speak in riddles, matey' is nothing more than an irritation.

There is an option to select text in either black and white, or yellow and white. Perhaps this is for a hard copy, though I found no built-in way to dump to the printer.

Loading and saving to tape or disc is supported and so is the command WHERE which I would normally only expect to find on multi-user adventures. If you discover you have left something behind, you can always use this facility to discover its location.

This game is certainly one of the best adventures I have played. If you want something to sit at while waiting for summer to arrive, I recommend you buy it with haste.

Paul Thornton



Ibix the Viking; Minerva, £19.96 for Archimedes only.

In this, Minerva's eighth game release, you play the part of a marauding viking by the name of Ibix. It is your task in life to wander the land, looting, pillaging and generally having a good time.

There are plenty of 'meanies' out to stop you but a quick flick of the wrist with your dagger should stop all but the meanest in their tracks.

Anyone familiar with *Hoverbod* (Minerva's second game) will know what to expect - *Ibix* is remarkably similar to look at and to play.

Graphics are best described as 'cute', with small, detailed sprites making up the majority of the scenery. Sound is up to the usual standard, with various sampled squeaks and grunts, squeaking and grunting at the appropriate moment.

However, the sounds in the production version of the game will be different, forming the basis of a 'spot-the-sound' competition to be launched by Minerva.

As well as the sound effects, there is also a vaguely musical bleeping in the background. It's a shame that Minerva couldn't have dispensed with the sampled effects and instead, had a 'proper' jolly tune to loot and pillage to.

The plus point *Ibix* has inherited from *Hoverbod* is the graphics which were also 'cute n' colourful'. Unfortunately *Ibix* has also got the same lousy gameplay.

Sprites tend to flicker and jerk around the screen, and control of Ibix himself is often sluggish and unresponsive. Fortunately there is a lot more to do, problems

GAMES

to solve, keys to collect and so on although this hardly compensates.

The only thing that can possibly save *Ibix* is the inclusion of a game designer. This is a complex section and allows all sprites to be redesigned as well as changing the behaviour of the meanies for different situations.

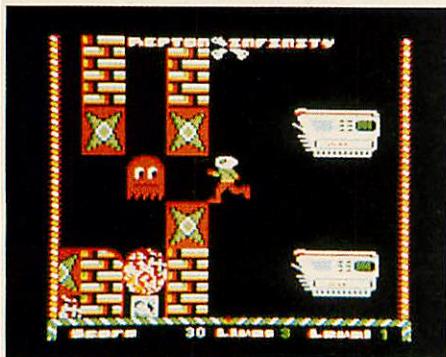
Scenery can be designed to any specification including animated pieces such as portulisses or clocks.

You can also add your own sound samples, that can be triggered by some action. Perhaps a 'squishy' sound as you inadvertently step under a falling block...

Ibix is a bit steep at £20 but Minerva is using the inclusion of the game designer to justify this. The game included with the package is pretty simple though you will get better results if you are willing to persevere.

I would only recommend this to hardened arcade adventurer or perhaps to *Hoverbox* fans (if such persons exist).

Rob Miller



Repton Infinity; Superior Software, Cassette for BBC micro, Electron £12.95, disc for Master £14.95 and for Compact £19.95.

This is the latest (and final?) offering from Superior in the seemingly never-ending *Repton* series. It is primarily an editor, allowing you to customise not only the map and the graphics (as in *Repton 3*) but also the behaviour of all the sprites in the game.

This is achieved by using three editors ('Landscape', 'Blueprint' and 'Filmstrip'), each of which produces a file used by a fourth program, the Linker, to create a game file. Finally, this is loaded into the game program.

Each editor allows you to place your name in the datafile, which is eventually used by the game against the title credits. The game comes with a function key reminder card to help you remember the various keys for the editors, and a large and well-written manual explaining how

to use the editors. There are three discs (or two cassettes), one containing the programs and the others holding datafiles. The data discs contain four games, each in two parts – *Repton 3 Take 2*, *Repton 4*, *Robbo*, and *Trakker*. These contain such creations as dynamite, pipelines, magiblocks and of course the photocopier!

The Filmstrip editor is the graphics editor. You can change the large game sprites, the map characters and the set of characters displayed at the bottom of the screen in the editors. These are saved in two files – one containing the sprites and map characters and the other containing the characters used by the editors. The latter can be loaded into the other editors to make editing easier.

Other useful features are the ability to copy graphics from one sprite to another, reflect the grids along horizontal or vertical axis, and also the ability to 'underlay' the space character for background design. Animated sprites, such as Repton himself, can also be tested.

The Landscape editor is used to design the four screens Repton will have to negotiate. It has a 'fill screen' facility, and in addition the DELETE key will insert a space. Moving the cursor onto a teleport displays the destination as well with a blinking T cursor – also used to select the destination when placing one of the six teleports.

Each screen also has a number of other options to hide the map and to make the level accessible only by a password. Finally, you have to set the 'minimum score' for the level. When your score reaches this value for the level, the screen flashes, a fanfare is played and you can then progress to the next level after being told the password. A useful calculator is built into the editor to help calculate this.

The Blueprint editor is by far the most complex of the three. You describe the behaviour of each sprite in a language called 'Reptol' which is then compiled to produce code used by the Linker.

Although the set of commands is sparse, this language is incredibly versatile – in a short while, I was able to change the game into something very similar to *Pac-Man*! Sadly, the shortage of memory restricts you in the complexity of the definitions. The definition is split into three sections: Type, Action, and Hits. These define flags associated with the sprite, how it behaves normally, and

what happens if something moves on top of it. You can also give a name to an object so that you can refer to it from other definitions.

The Linker is where you create the game data file, used by the game itself,



from all the others. At this stage you also enter two lines of text – one to be displayed on the title screen and the other when the player has completed all four screens.

A description of the game itself is somewhat difficult since it can be redefined out of all recognition but there are a couple of major differences from *Repton 3*.

Moving sprites can no longer run under stationary sprites – such as the sprites in *Repton 3* moving under the earth without deleting it.

Also, to complete a screen, you wait until the fanfare sounds and then press 'tab'. Lastly, when viewing the map all the other sprites in the level keep on moving!

The BBC Master has (as is now usual) an enhanced version of the game. All the editors and the game load into sideways Ram and you can swap between them retaining the data which is currently in the section.

This makes testing much easier and is especially useful in Blueprint to test your code. The Linker has a new option to save all the data at once in one large file but unfortunately there is no confirmation to the save or load and it is very easy to overwrite your data.

Repton Infinity is a definite must for any disc user who prefers a little thinking to straightforward 'zap the aliens' type of software. However, cassette users may find the constant file saving and loading a bit tedious.

The game can be fully redesigned, and so it is unlikely to lose its appeal in the near future. The only problem is – having reached infinity, what do they call the next one?

Steven Shipway

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Part 3	(Solutio - 1 mps)	Elar	(Solutio - 1 mps)	Part 3	(Solutio - 1 mps)
Tulpe Block	(Solutio - 1 mps)	Twin Canyon Valley	(Solutio - 1 mps)	Arizona Zone	(Hepatitis - 1 pneumonia)
Part 3	(Solutio - 1 mps)	Orion Ode	(Solutio - 1 mps)	Planet 2	(Hepatitis - 18 mps)
Part 3	(Hep - 1 mps)	Enthal?	(Solutio - 1 mps)	Bonewitcher	(All pneumonia - 1 mps)
Part 3	(Solutio)	Thorn	(Solutio - 1 mps)	Part 3	(Solutio)
Myrm	(Solutio)	Shindred	(Solutio)	Orion	(Solutio)
The Lost Creek	(Solutio - 1 mps)	Cadence - David	(Solutio - 1 mps)	Quant for Freedom	(Solutio - 1 mps)
Part 3	(Solutio - 1 mps)	Thompson	(Solutio)	Harold	(Solutio)
Quest	(Solutio - 1 mps)	Part 3	(Solutio)	Sequela	(Hepatitis)
Harwood	(Solutio - 1 mps)	Philosophy's Quest	(Solutio - 1 mps)	Rick Hamon	(Solutio)
Part 3 of the Free	(Solutio - 1 mps)	Rick Hamon	(Solutio)	The Hunt	(Solutio)
Part 3 of the Free	(Solutio - 1 mps)	Part 3	(Solutio)	Acute Wall	(Hepatitis - 1 mps)
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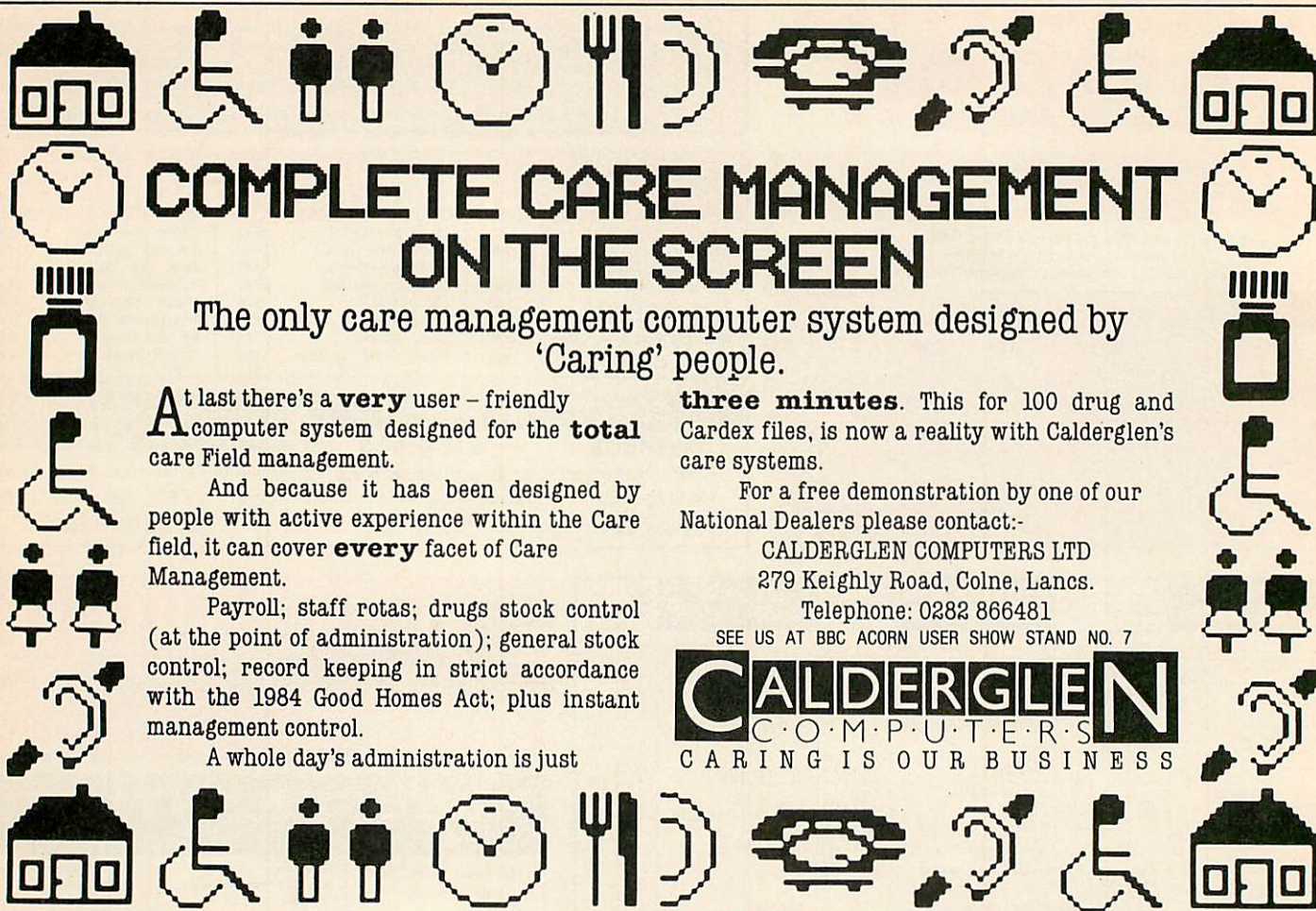
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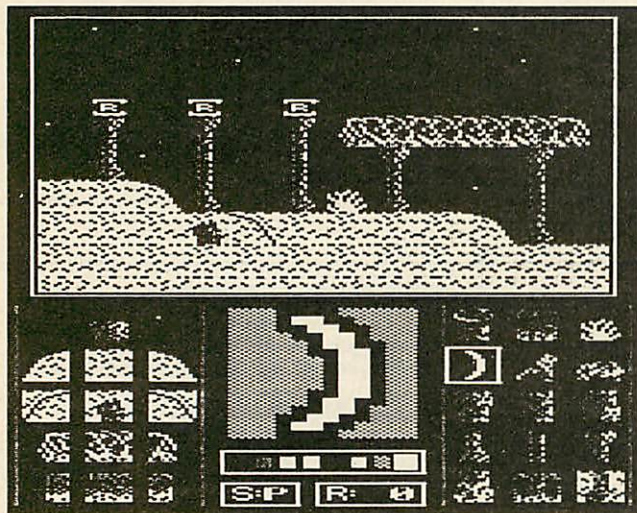
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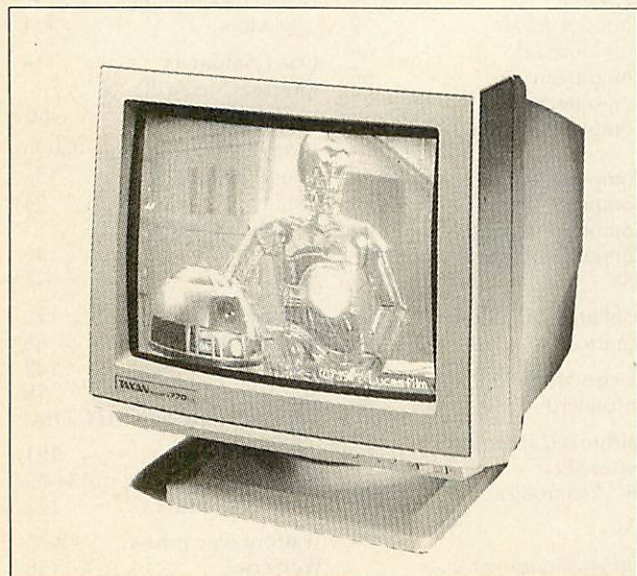
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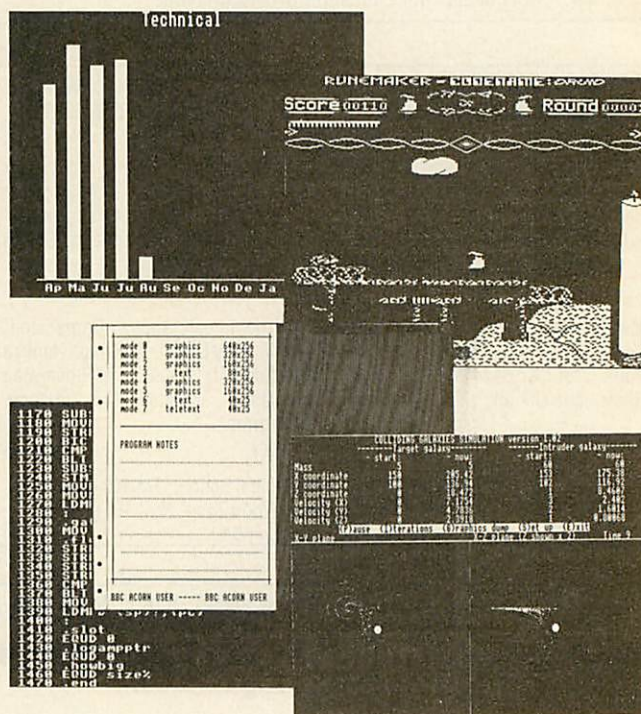
Also in the August issue, the never ending story of interfacing your Archimedes continues with how to add a BBC micro user port podule.

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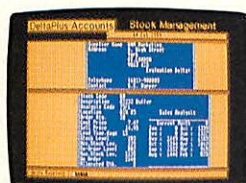
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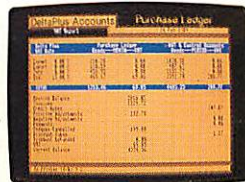
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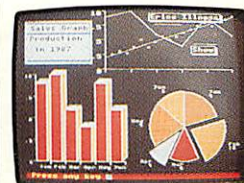
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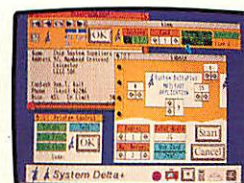
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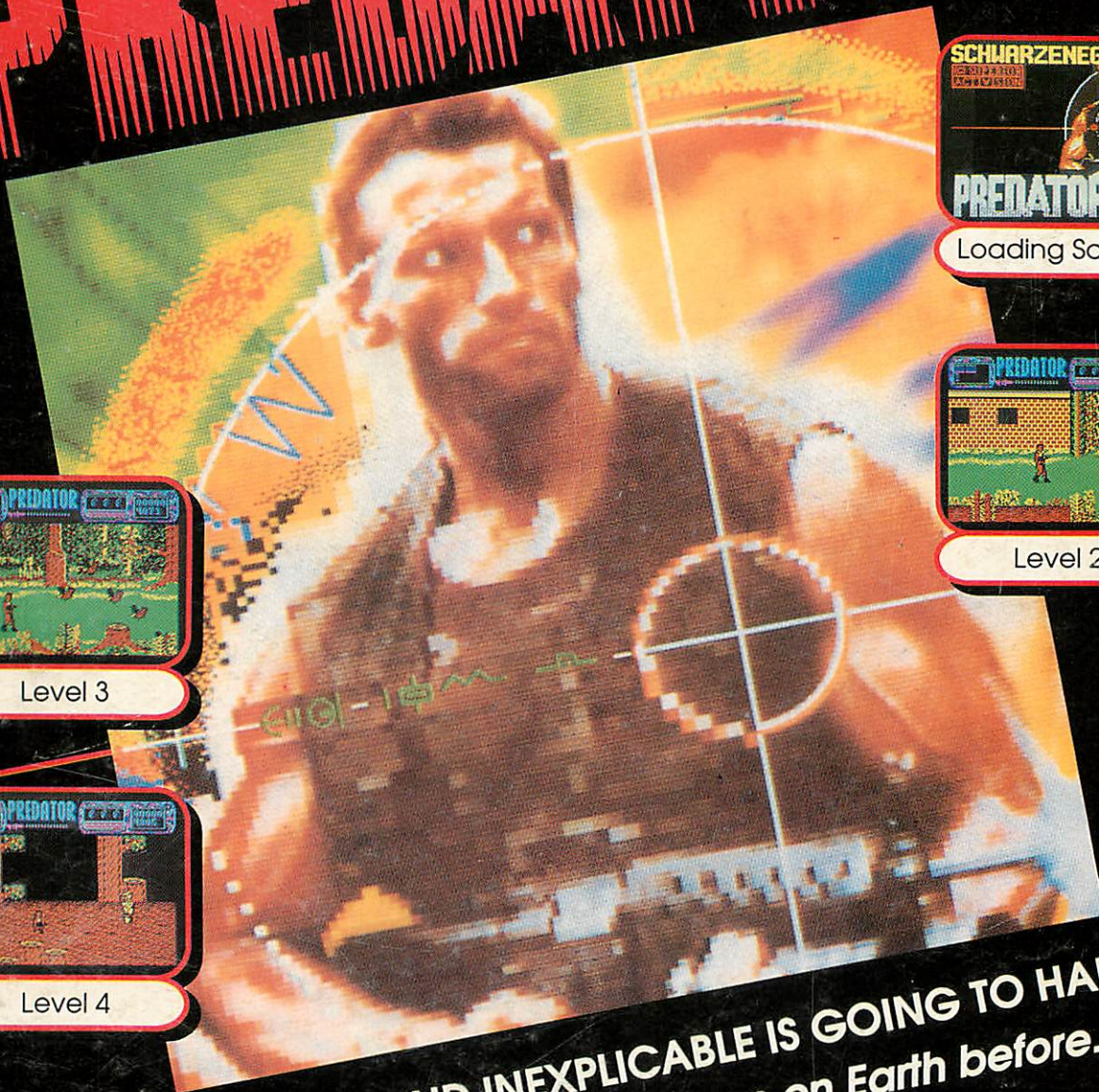
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